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Aqueous Rubber Dispersions

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AQUEOUS dispersions, emulsions and suspensions of many materials have found increasing value in industry and in the arts. Rubber in the form of latex has replaced other forms of rubber in many places and has made possible many new uses for rubber. Crude rubber, reclaimed rubber, synthetic rubber and their compounds are now available in the physical form of latex, and as latex has done, they also are increasing the usability and the uses of rubber. The term "artificial latex" is often applied to these dispersions of rubber. "Dispersite" is the commercial name applied to one such material manufactured under the original Pratt patents.

Although earlier attempts had been made with some degree of success, to redisperse coagulated rubber in water, the first method of practical importance was described by Pratt *(1)* in 1922. For this process the rubber was swelled and dissolved in an organic solvent. Oleic acid and ammonia was added to form a soap *in situ*. Water was then slowly mixed into the mass and an emulsion was formed which could be diluted with water. The solvent could then be removed by evaporation or vacuum distillation, leaving the water dispersion of rubber. In developing his method Pratt soon found that dispersions could be made in a similar way without the aid of solvents *(2)* and this discovery has been developed by Dispersions Process, Incorporated, into one of the most important commercial methods of the present day.

Pratt believed that the rubber latex particles retained their individual identity of hydrocarbon globules surrounded by a shell of protein *(2)* through coagulation and to some extent through the milling and even vulcanizing processes. According to his theory if water is slowly added and mixed intimately with rubber the protein layer will absorb the water and be-

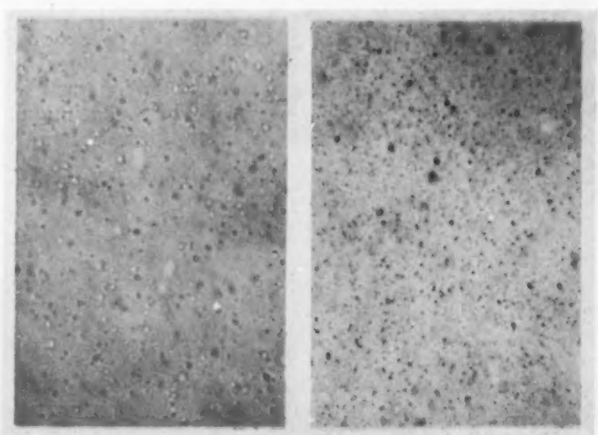

FIG. 1
Natural Rubber Latex Reclaimed Rubber Dispersion
(2100x Magnification)

TABLE I

PROPERTIES OF RECLAIMS FOR DISPERSITE

Type of Reclaim	*Whole Tire*	*Red Tube*	*Light Tube Type*
Color	Black	Red	White
Specific Gravity	1.15	1.18	1.22
Acetone Extract (16 hr.)	9.5%	9.0%	8.3%
Ash	15.5	27.0	29.
Carbon Black	11.5	None	None
Cellulose	1.0	None	1.0
Moisture	.5	.5	.5
Combined Sulfur	1.78	2.16	1.7
Tensile (5% S. cure)	1000	1500	1200
Elongation (5% S. cure)	450	620	640
Total Fatty Acid as Stearic	2.78	3.96	2.03
Viscosity 82° C.[a]	75.	70.	70.

(a) See Mooney, M., *Ind. Eng. Chem. (Anal. Ed.)*, 6, pp. 147-51 (1934).

come softened. The adhesion between the particles will then become weaker and their surfaces will slip past each other. Hauser has also made reference to the structure of the globule *(3)*.

If an emulsifying or peptizing agent is added to restore the charge of the particle, this will also be absorbed by the softened protein layer and finally cover the entire surface of the globule. When enough water has been added the particles will break apart and disperse; the water at this point becomes the continuous phase and the rubber becomes the dispersed phase. The mixture may then be diluted with water easily. The fact that the particle size of dispersed crude rubber or even reclaimed rubber is similar to that of latex, lends support to Pratt's theory. This is true whether the dispersion is prepared in an internal mixer of any suitable type or on an open mill.

In commercial application the rubber may be plasticized and dispersed in a Banbury mixer, or as is usually the case the rubber is plasticized on an open mill and then transferred to a mixer of the Werner and Pfleiderer type. The dispersing agent, compounding, and curing ingredients are added on the mill or in the mixer as desired. When enough water has been added the mixture will disperse. The quantity of water required varies considerably with the temperature but is frequently about 18%. At this point the power consumption of the mixer drops abruptly and the compound becomes a soft smooth paste and is diluted with water to the desired consistency.

Another method of considerable commercial importance in the manufacture of aqueous rubber dispersions has been described by Levin *(4)*. The rubber is plasticized considerably with the aid of softeners in a Banbury mixer. The dispersing agent is mixed with a filler (clay or whiting) and water to give a stiff paste in a Werner and Pfleiderer mixer. The softened rubber, is then added to the mixer and dispersed in the aqueous paste which remains as the continuous phase. High temperatures are maintained throughout the operation.

Types of Dispersing Agent

Three types of dispersing agent have been used commercially: (a) Colloidal clays of the bentonite type; (b) Proteins; and (c) Soaps. Mixtures of these classes of materials are also used.

Compounds dispersed on clay are very easily prepared and find use where a rather hard, very tough film is required. The film is somewhat water absorbent and cannot be used where it will be in contact with water unless the compound has been rendered irreversible by treating with a flocculating agent *(5)*.

Crude and reclaimed rubber dispersed on casein, glue or other proteins, have found definitely valuable applications. They produce a strong, high modulus film with outstanding adhesive properties. A fairly large amount of protein is required for dispersing and hence the compounds are of high viscosity. Compounds prepared by dispersing on soap are more widely applicable and will be discussed more fully.

Crude Rubber Dispersite

The properties of crude rubber dispersions in general are described by Trumbull *(6)*. In many ways they resemble latex. The chief point of difference lies in the fact that masticated rubber is necessarily used in preparing them and the resultant film will have the softness, tackiness and transparency of masticated rubber in contrast with the hard, non-tacky and opaque film from latex. Consequently they have an advantage over latex in certain types of adhesive work and are also of value for adding to latex compounds to give them better adhesive properties.

Compounding materials are added and intimately mixed with rubber by usual milling procedures before dispersing. The compounds are not limited to the use of only such compounding ingredients as are obtainable in colloidal solutions or water solution, as is the case with latex. Moreover, compounds which are milled into the rubber do not show as great a tendency to settle from the finished compound as when they are added to the latex in the colloidal state.

Reclaimed Rubber Dispersite

Dispersions of reclaimed rubber bear the same relationship to latex as reclaim itself does to crude rubber. They have extended the use of reclaim in the same manner that latex has made possible the use of rubber in fabricating articles generally considered outside the rubber industry. Many important industrial applications have been found for reclaim Dispersite in competition with latex compounds or as extenders for latex compounds because of lower cost or because of definite advantages in properties or both. Reclaim shows advantage over crude rubber in that it is already vulcanized and so has better aging properties, and is less affected by extreme temperature conditions.

Reclaim dispersed on soap has been more widely applicable than other types in practically all applications. Soaps such as sodium or potassium oleate, stearate or abietate are generally used but in some cases the base may be ammonia, triethanolamine or other organic bases. The chief advantage of soap Dispersites lies in the fact that it is possible to pre-

TABLE II

COMPARISON OF LOW SOAP DISPERSITE WITH LATEX

	Red Tube Dispersite	*Normal Latex*	*Creamed Latex*
Viscosity in Centipoise at 50% Solids[a]	21.	——	14.8
Viscosity in Centipoise at 40% Solids[a]	13.0	15.8	9.7
Surface Tension 35% Solids[a]	33.5	36.0	32.5
Foaming Test 35% Solids	Slight	Considerable	Considerable
pH[a]	11.35	10.26	10.05
Water Extract[b]	5.26	8.16	2.85
80′ Mesh Screen Passing	99.8%	100%	100%

(a) See Messrs. Jordan, Brass and Roe, *Ind. Eng. Chem. (Anal. Ed.)*, 9, pp. 182-89 (1937).
(b) See Fowler, D. E., *Ind. Eng. Chem. (Anal. Ed.)*, 9, pp. 63-66 (1937).

pare them on a very much smaller quantity of soap than on any other type of dispersing agent, and the final compound is, therefore, much more nearly a pure rubber or reclaim dispersed in water, and is diluted with the least quantity of dispersing agent.

High quality Dispersite is usually characterized by low initial viscosity unless thickening agents have been purposely added for some particular application. Viscosity should not increase appreciably on storage over a considerable period of time, and the dried and cured film should have tensile and elastic properties comparable with that of the reclaimed rubber from which it was made. If the reclaim is plasticized too much by using excessive quantities of oils or excessive heating in the reclaiming process or preparatory to dispersing, these general characteristics will not be met.

In some of the early work too large an excess of rosin soap was used. Not only did the unnecessarily large excess of rosin soap tend to give a weak, sticky film even when cured, but the compounds had an abnormally high viscosity in consideration of the solids. The viscosity increased on storage and eventually the compounds would gel and coagulate. Moreover, the viscosity was very sensitive to differences in pH and it was difficult to control the uniformity of the product.

In order to disperse satisfactorily a normally plasticized reclaim on the minimum quantity of soap, very careful control of the process is required as to temperature, rate and order of addition of ingredients (including the water), and the amount of mixing immediately before and after the change of phase.

The type of reclaim to be selected of course depends on the qualities of the film finally required. The reclaim should be well refined so as to be free from hard particles. If a high tensile film is desired the reclaim should not be softened very much with oils or plasticizers as this may weaken the resulting film. Table I gives the physical and chemical properties of satisfactory high-grade reclaims for general requirements.

These reclaims may be dispersed on soap without the addition of any fillers, softeners or colloidal materials excepting the soap-forming base. If vulcanizing compounds are required the sulfur, accelerator and possibly zinc oxide are also added during the process. Such a Dispersite is of high quality and is suitable for many uses, particularly as a substitute for latex or in lowering the cost of latex compounds with the minimum reduction in quality of the film. Table II shows a comparison of the properties of a red tube reclaim compound with rubber latex.

The particle size of a dispersed reclaim is shown in comparison with that of latex in Figure I and it is to be noted that they are of the same order.

The analytical data and microscopic examination both show considerable similarity between low soap Dispersites and latex. The surface tension, however, is not a direct indication of the foaming tendency as shown by bubbling air through the sample under controlled conditions. The foam is much less permanent in the case of these Dispersites than in either type of latex.

Although the low soap Dispersites show a very high mechanical stability when tested by methods generally used for latex *(7)* they are quite unstable to rubbing, and dry and set very rapidly. They are useful as adhesives where some bond is required in a relatively short time. Compounds can be made which are about as rapid setting as concentrated latex. They need, however, to be further stabilized with additional soap or other stabilizers if they are to be diluted considerably with water or have quantities of dry fillers stirred into them or if they are to be exposed to freezing temperatures. Even when well stabilized they may become unstable on extreme dilution and for this reason it is advisable, when mixing with water or gum solution, to add the solution to the Dispersite, and never add the Dispersite slowly to the diluting solution.

TABLE III

LATEX-DISPERSITE MIXTURES (VULCANIZED FILMS)

% Latex Solids	*% Dispersite Solids*	*Tensile*	
		Red Tube	*Whole Tire*
100	None	6100	6100
75	25	4800	4500
50	50	4000	3900
25	75	3200	3100
10	90	2500	2100
0	100	1500	1075

Reclaim Dispersites have unusually good aging properties. Antioxidants have been found to be very effective in prolonging the life of both unvulcanized and vulcanized reclaim films. When they have been properly protected with anti-oxidants they have been found to be definitely better aging than crude rubber solvent cements or lattices in many applications. This advantage is pronounced in applications in which the film cannot be properly vulcanized.

Mixtures with Latex

Low soap Dispersites may be mixed with latex without difficulty to give compounds with intermediate tensile properties. Tensile values that are obtained on curing mixtures of latex and Dispersites are given in Table III.

Industrial Applications

Dispersites may be used alone or in mixtures with latex for making rubber-coated fabrics and pile fabric upholstery, for wet and dry combining of textiles, impregnating paper, making gloves and other dipped goods, making foam sponge, expansion joints for roads, abrasive wheels, and ceramic moldings. They are used extensively for binding the pile to the backing in the manufacture of automobile rugs and as a reinforcing sizing and non-slip material for domestic rugs and rug cushions. A wide variety of adhesive uses have been developed among which is the laying of flooring and other building materials and the assembly of automobiles. They may be used along with starches, gums, dextrines, caseins, asphalts, etc., to fill many sizing and adhesive requirements.

It is to be expected that reclaim compounds can be used generally wherever latex can be used excepting where extremely high tensile strength or an almost transparent or delicately colored film is required.

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(5) Pratt, W. B., U.S.P. 1,731,725 (1929).

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Macbeth Toggle Press

Principles of the Toggle Press for Tire Vulcanization Have Now Been Adapted to the Molding of Mechanical Rubber Goods

TOGGLE presses for the vulcanization of tires built to patents owned by Colin Macbeth, well-known rubber technologist and engineer, have been made for many years by Messrs. Rogers, Wilson & Co., Ltd., Birmingham, England. When closed in the vulcanizing position, these presses are not subject to opening in the event the power, whether hydraulic or electric, is cut off. The benefits of the toggle principle, as exemplified by Macbeth designs and patents, have now been applied to the molding of general mechanical rubber goods, as well as for the molding of plastics.

A remarkable feature of the new toggle press for mechanical rubber goods is the enormous molding pressure which is obtained by a small diameter ram working at comparatively low pressure. The press illustrated herewith, which has platens of 24 x 27 inches, when operating at 300 pounds hydraulic pressure converts a ram pressure of 11 tons into a pressure on the mold of 300 tons after making a very generous allowance for friction. A direct acting ram to give the same mold pressure would require to be:

24-inch diameter at 1,500 lbs. sq. inch
29-inch diameter at 1,000 lbs. sq. inch
34-inch diameter at 750 lbs. sq. inch

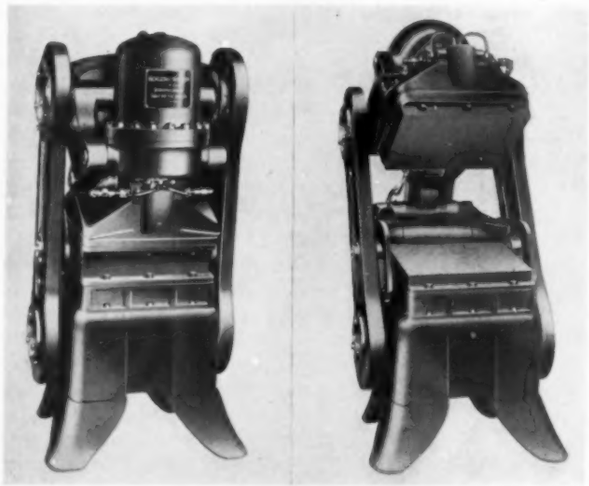
The advantages of working to low hydraulic pressures are well known to all maintenance engineers who realize the greatly increased life of packings working at low pressures.

The illustrated Macbeth toggle press provides approximately 2-inch travel of the top platen in a position parallel to the bottom platen, after which position the top platen lifts to approximately the 45° position where both top and bottom mold are unobstructed by any pillars at the front, as is the general case with direct acting ram presses. The plain steam platens can be arranged to suit the particular requirements of the molder.

Another valuable feature of the new press, associated with the special toggle system used, is that during the operating period in the closed position, the hydraulic supply can be and is regularly turned off, this action resulting in an economy of power and extending the life of the packings, since they are subject to internal pressure only during opening and closing and when in the open position.

All parts used in the construction of the press are sturdy, high-quality cast steel being used for the main parts. An automatic control valve of special design is supplied with the press to meet requirements, and, if desired, is coupled to operate by any of the ordinary time-control devices. The press requires no foundation and, as may be noted by the illustration, is not even bolted to the floor.

A description of the toggle link action should prove of interest. Two cast steel side links are trunnioned about two trepanned bosses which are integral with the base casting. The top ends of the side links bear on the trepanned upper ends of a toggle link, which is attached to the top mold plate, the load coming upon two segmental bearings at this point without over-hung



Closed and open views of the new Macbeth toggle press suitable for the molding of mechanical rubber goods.

effect. The toggle linkage in the closed position is normally ¼-inch off the infinite toggle position.

The hinge point for the top mold member is on a cross pin which is supported by two links having a shaft axis supported by a tongued and grooved bracket bolted to the base casting. In order to insure that the mold members shall be "square" or parallel for a sufficient distance when closing and opening, two cam surfaces are provided on the side links which control the vertical position of the axis pin in relation to the vertical position of the toggle lower end. Thus on the inner face of each main side link is arranged a roller which in moving towards or away from the axis times the lift of the axis pin.

In this manner there is provided a square lift of 1⅞ inches from the closed position which is sufficient to provide accurate mold control for even extremely deep draws on molds. The operating cylinder in the closed position is "home" against two stop faces on the top mold member, thus insuring that when closed no bending moment can occur in the mold member in the event of hydraulic pressure still being maintained on the under or closing side of the double acting ram.

The press is fitted with steam-heated platens suitably connected, and equally suitable ejector arrangements are fitted wherever and whenever needed. Simple means are provided to deal with molds of standard series of thicknesses by using "slipped in" make-up packing plates which are easily changed within a few minutes.

A substantial drainage pocket and guttering are provided in the new toggle press to trap any normal leakage from the ram packing. The press "sits" on three feet, two being at the front corners so that no holding-down bolts are required. It can be operated by any suitable valve and may be connected to any of the various time and temperature control gears which are now available.

Use of X-Ray Diffraction Equipment

A Description of an Advanced Apparatus Together with a Brief Resume of Some Work Done with Rubber Products

A RECENT article in this publication *(1)* was devoted to a thorough description of various x-ray equipment developed in European countries in the past few years which have led to new methods of microstructural investigation of a variety of materials, including rubber. A number of new pieces of x-ray apparatus were illustrated. Since publication of the article our attention has been called to the fact that development of x-ray equipment in this country has kept pace with European developments, and in many instances has surpassed it insofar as equipment and beneficial results are concerned.

Application of Diffraction Analysis

That considerable attention has been given to the application of x-rays in the study of rubber in this country and Canada is indicated by the literature. By far the most important application in this industry is that of diffraction analysis. The first important study was devoted to the structure of rubber *(2)*, and since that time further progress has been reported *(3, 4, 5, 6)*. It has definitely been shown by x-ray diffraction analysis that a time interval is required to build up fiber structure in stretched rubber.

One of the leading manufacturers of x-ray equipment for radiographic work in this country is the St. John X-Ray Service, Inc., 30-20 Thomson Avenue, Long Island City, N. Y. In addition to producing the equipment, this concern also acts as consultants on radiography and conducts commercial research. A typical piece of up-to-date x-ray equipment is shown in Fig. 1. The water-cooled vacuum tube has four windows in the central chrome-iron sleeve for the rays to emerge. Four instruments are arranged opposite the openings for simultaneous exposure. Coarse-grained materials can be rotated during the exposure by means of a vacuum cleaner fan, as indicated. A variety of mountings is available for different specimens and purposes. The various types of instruments are interchangeable and can be arranged around the tube.

While the same result may be obtained in a number of different ways with this equipment, for exact comparison two specimens must be mounted in the same instrument and examined under the same conditions. Since this factor is very important for patent work, the diffractometer seen in front of the x-ray tube in Fig. 1 (also developed by St. John) is said to be still one of the most important instruments in the field of radiography although it was designed more than twenty years ago.

Radiography in the Rubber Industry

Radiography lends itself to the rubber industry in a number of different ways. Herbert R. Isenburger, of the St. John X-Ray Service, advises that that firm has x-rayed rubber tires and more recently rubber tire molds. Tires can also be inspected fluoroscopically, which should be of special interest to second-hand tire dealers. Metallic inserts in rubber heels can be checked by the use of x-ray equipment to determine whether the inserts are properly positioned. Rubber insulated cables have been subjected to x-ray analysis, as have golf balls. One interesting application of this equipment in the commercial field is that practiced by Eastman Kodak which makes certain that rubber-lined chemical equipment is properly aligned by radiographing the individual units.

The important development in the field of x-ray equipment lies in the direction of photography. Photographs, or exographs as they are called when made

FIG. 1—St. John x-ray apparatus, with diffractometer in front of x-ray tube.

(1) "Some Newer Methods of Microstructural Investigation," by Alfred Salmony, *The Rubber Age (of New York)*, December, 1938.
(2) "X-Ray Study of Rubber Structure," by Acken, Singer and Davey, *Industrial & Engineering Chemistry*, January, 1932.
(3) "Progress in X-Ray Research on Rubber," by G. L. Clark, *The Rubber Age (of New York)*, November, 1935.
(4) "Physical Properties of Raw Rubber," by G. S. Whitby, *Canadian Chemistry & Metallurgy*, January, 1937.
(5) "X-Ray Diffraction Patterns of Sol, Gel and Total Rubber when Stretched, and When Crystallized by Freezing and from Solutions," by Clark, Wolthuis and Smith, *The Rubber Age (of New York)*, October and November, 1937.
(6) "X-Ray Diffraction Patterns of Crystalline Sol Rubber Prepared from Ethereal Solution," by Clark, Gross and Smith, *Journal of Research*, January, 1939.

with x-rays (they are called gammagraphs when made with gamma rays), permit technologists to study conditions within materials used for industrial purposes. The "camera" used on the St. John equipment is actually a film holder containing a pair of intensifying screens which speed up the exposure considerably. X-ray film is coated on both sides so that the reaction is doubled.

Preparation of Film Holders

Intensifying screens are made of calcium tungstate, a chemical which converts x-rays into light rays to which the film emulsion is much more sensitive. These film holders, or cassettes, can be made of metal for standard sizes or can be made up readily of cardboard. The cardboard holders are particularly convenient for odd sizes or when a great number of film holders are used to speed up routine inspection work since they are inexpensive and light in weight.

Perfect contact between the screens and the film must be maintained. For this purpose, the flexible holders are tied between two Bakelite sheets and placed on one side of the specimen under examination. On the opposite side of the specimen is the x-ray tube. The x-ray tube until recently was the weakest link in installation, but new tubes developed make fast and efficient work possible.

Brief reference to the use of radiography in the field of rubber is contained in *Industrial Radiography*, by St. John and Isenburger, published by Wiley in 1934. Two illustrations from this book are reproduced herewith, Figures 2 and 3. Fig. 2 is an exograph of an automobile tire which shows what happens in the casing when the tire goes over a bump or obstruction in the road. A tear in the fabric is indicated by the faint white line in the lower left hand section of the exograph. The casing is a positive print made from a negative. Fig. 3 is an exograph of an undersea cable. This was directly x-rayed on paper instead of film. The light center portion indicates the copper core and the dark elongated area at the left discloses a splice.

Work Done on Synthetic Rubbers

According to Mr. Isenburger, the most important private work, unpublished, has been done with x-ray diffraction equipment on the so-called synthetic rubbers. The idea is to obtain an identical pattern from the synthetic material as that obtained from the natural product. Work of this type is being conducted at the laboratories of the St. John X-Ray Service, while

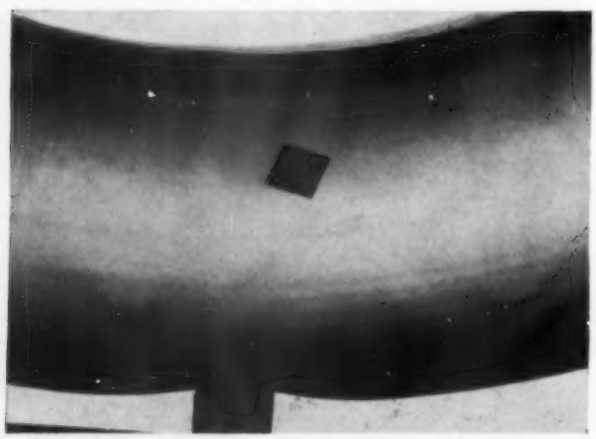


FIG. 2—Exograph of an automobile tire indicating what happens in the casing when a tire goes over a bump or obstruction in the road.

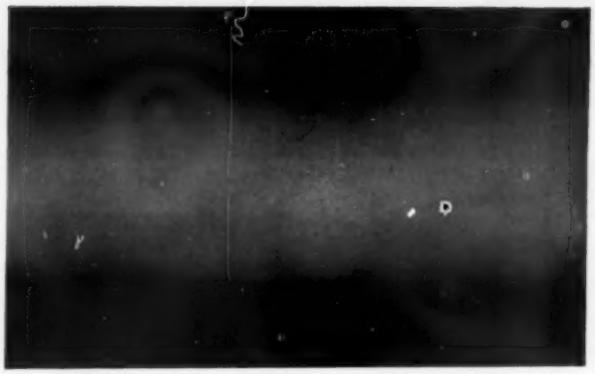


FIG. 3—Exograph of an undersea cable, the center portion indicating the core with the dark area at the left disclosing a splice.

that company has installed special equipment and instruments for similar work in some of the leading laboratories of the country, including those maintained by Columbia University, U. S. Steel, Union Carbide & Carbon, and others.

Synthetic Rubber Processes

THE possibility of manufacturing so-called synthetic rubbers from various raw materials continues to occupy the attention of inventors. The United States Patent Office recently issued two patents covering suggested methods, while the United States Bureau of Dairy Industry announced the perfection of a process for making a transparent rubber-like substance from lactic acid.

One of the patents issued (U.S.P. 2,154,852) concerned a method of making synthetic rubber from mineral oil residues, by-products of the petroleum-cracking industry. According to the process of synthesis outlined, the residue is first mixed and baked with crude sulfur. Rosin is then added and the mixture is further baked. Next, sulfuric acid is added, followed by hydrochloric acid. After the acid treatment comes neutralizing with caustic soda and drying the finished mass. The completed material is said to be similar to natural rubber in its properties and can be vulcanized. The patent was issued to Ernst Kleiber and assigned to the Hevaspar, S. A., of Geneva, Switzerland.

The other recent patent (U.S.P. 2,150,068) was also granted to Mr. Kleiber and assigned to the Hevaspar concern. It covered the manufacture of synthetic rubber from ordinary sugar and turpentine. Beet or cane sugar or sugar refinery waste is first treated with a mixture of nitric and hydrochloric acid while stirring for approximately 18 hours Then turpentine is added and the mass is further stirred until fully thickened. In the reaction that takes place, according to the patent, the molecules of saccharose and turpentine "polymerize" or interjoin to form complex rubber-like compounds. The acids are then neutralized with caustic soda and the mass is washed and dried. The yield is said to be 78 to 83% of the starting material.

The rubber-like substance of transparent character developed by the United States Bureau of Dairy Industry is made from the lactic acid of whey, the latter being a by-product of the dairy industry, both in the manufacture of cheese from whole milk and the manufacture of casein from skim milk. The substance, known as polymethyl acrylate, is said to be elastic, tough, easily soluble and stable to sunlight and ultraviolet rays, making it valuable in the preparation of lacquers, varnishes, impregnating compounds and cements.

Removing Static Electricity

Use of the Chapman Electric Neutralizer Device on Rubber Spreaders and Coating Machines to Eliminate Fire Hazards

By William C. Glass

Licensed Professional Engineer; Member, A.S.M.E.

STATIC electricity in addition to acting as a powerful brake on the efficient operation of certain industrial machines is also a formidable fire hazard in several manufacturing processes which involve the presence of inflammable or explosive vapors. Rubber spreaders and other types of coating machines which require the use of inflammable solvents in their operation are typical examples.

Definition of Static Electricity

In order to discuss the elimination of static electricity it may be well first to define it. Static electricity, insofar as it is capable of definition, is electricity at high pressure manifesting itself by attraction and repulsion between materials in which it is standing and endeavoring to escape. It appears in the form of static or stationary charges which may be of either positive or negative polarity and of various degrees of intensity.

Scientific investigation reveals that static charges can be rendered ineffective absolutely under all conditions only by bringing them into contact with equal and opposite charges. Stated in its simplest terms, materials charged with static electricity can be neutralized only by passing them through an alternating electro-static field.

The practical method of applying this academic solution is an invention by William H. Chapman, universally known as the Chapman Electric Neutralizer. At the present writing there are more than 15,000 installations of this equipment in use on all kinds of industrial machines, including a score or more in rubber factories. This neutralizer consists of two essential elements—a power unit to produce the corrective charge of alternating current of suitable intensity and in a safe form, and a so-called "Inductor Bar" for attachment to the machine requiring treatment in order to deliver the opposing charges, or, to express it another way, to provide an alternating electro-static field for charged material to pass through.

On rubber spreaders, static electricity is generated at the spreader knife and of course it is in this area that inflammable vapors are most prevalent. Therefore, the discharge of an accumulation of static near the spreader knife usually results in a flash fire or explosion. There are certain other coating processes in which the hazard is even greater than on rubber spreaders.

Anticipating the question which most readily occurs in discussing these problems, it is definitely a fact that the use of the Chapman neutralizer in such industrial processes does not create another hazard of greater potential danger than the hazard it is installed to eliminate. The construction of the equipment for these applications is such that it is entirely and absolutely safe. This statement is amply substantiated, from a practical standpoint, by a large number of installations in use under most hazardous conditions. From a theoretical standpoint, a careful examination of the operation of the neutralizer will reveal that it operates with a wide factor of safety.

The report of an examination of the Chapman electric neutralizer by a nationally recognized laboratory contains the following conclusions:

"For the purpose of determining what effect the discharge from the inductor to a grounded surface had on combustible material, wads of paper and cheesecloth, both dry and wet with gasoline, and strips of cellulose nitrate film were held both between the inductor points and the grounded bar or near the discharge around the inductor points while the devices were operating from a supply line of rated voltage. The result was that no combustion took place under any condition, thereby indicating that no ignition results.

"While connected to a line of rated voltage, measurement was made of the secondary current of both transformers. The secondary current was found to be approximately 10 milliamperes while operating at rated input voltage. This value compares favorably with the 25 milliampere limit which medical science has established as being the limit of current which can be conducted through the body without dangerous results."

Solves Problem in Rubber Factory

Quite recently an unusual problem developed in a rubber factory and the Chapman electric neutralizer was subjected to exhaustive tests over a long period of time to prove its effectiveness and safety before actual use. In describing the problem, one of the chemical engineers of this plant stated: "The process we want to protect involves the spreading of a highly inflammable plastic substance on a moving belt, from which it is later stripped." After certain conclusions had been reached the research department of this plant was called in to check on them. Referring to the results, the engineer wrote as follows: "It may interest you to know that our research man inserted your neutralizer in a glass bomb which was then filled with a gas mixture identical with the one we are dealing with in practice. The experiment was entirely successful as no ignition took place."

Under some limited conditions it is possible to reduce the susceptibility of certain materials to the generation of static charges and thus prevent the accumulation of static to the extent that it becomes troublesome or a fire hazard. Such conditions, how-

ever, are not dependable. A mere draft of air may change the susceptibility.

The Chapman process does not attempt in any manner to prevent the formation of frictional or static electricity. What it actually does is to neutralize instantly and completely any charge, whether great or small, regardless of its polarity the instant that the charge begins to develop. It operates automatically in this respect so that the material being treated is delivered uniformly in a neutral condition under variable atmospheric conditions.

It might be well to remark, however, that eliminating the static charges from materials at one point in a process is no guarantee that other charges will not be developed in the same materials when subsequently exposed to conditions which are conducive to the generating of static electricity. Thus, in some applications of the neutralizer it is necessary to have several inductor bars on one machine to eliminate the static which may be developed by pressure or friction acting on the material in its passage through the various mechanisms involved in the process in question. A rubber spreader may under some conditions be amply protected with one inductor bar but ordinarily requires two inductor bars. Some types of machines, on the other hand, may require as many as 12 or 15 bars in a single installation.

Alternator Used for Direct Current

When alternating current is available the corrective charge required in the inductor bars is developed by the use of a step-up transformer. When direct current only is available it is necessary to install a small alternator or rotary-converter to change the direct current to alternating, and in conjunction with this a step-up transformer the same as required for alternating current service.

The Chapman electric neutralizer contributes to the elimination of waste, the reduction of fire hazards, and increased efficiency of machinery and processes in many fields, and particularly in the paper, printing, textile and rubber industries.

Acidseal Protective Paint

ONE of the problems faced by manufacturers who process rubber products direct from latex is to protect the latex from contamination and discoloration during shipment and handling. The main difficulty lies in the fact that it is necessary to mix a certain amount of ammonia in the latex to preserve it. When the ammonia comes in contact with metal a chemical reaction results which often causes contamination and discoloration.

A practical solution to this problem is said to be found in Acidseal, a new type of paint developed by the B. F. Goodrich Co., Akron, Ohio. Unlike ordinary paints, Acidseal contains a special rubber isomer instead of the usual oil or resin. The action of this rubber isomer is to eliminate any effect of ammonia on metal and, when applied to the interior surface of tank cars, storage tanks and pipe lines, it assures complete protection to the latex.

Acidseal is likewise servicing industry in other ways. It is being used by suppliers of caustic liquor to the rayon industry, the transportation and storage of which also raises a problem of freedom from contamination and discoloration. Manufacturers of costly dyes are painting the interior of their shipping drums with Acidseal as a protective measure. The paint is also generally applicable as a protection against the action of corrosive fumes.

Rust-Ban Non-Drying Coatings

PREVENTION of rust on molds which are stored away for future use is a problem faced by practically every rubber manufacturer. Non-drying coatings of one kind or another, generally called "slushing compounds," made up of various oils, greases and petrolatums, are ordinarily used for rust prevention on stored molds. As a rule, these compounds do not entirely offset the electrochemical conditions which cause rust. The Standard Oil Company of New Jersey, 26 Broadway, New York City, however, has introduced a line of non-drying coatings under the trade-name of Rust-Ban which are said to be perfect rust preventive agents.

Special Compound Inhibits Rust

Rust-Ban coatings incorporate a special compound which definitely inhibits rust formation, according to the manufacturer, the petroleum products utilized in making these coatings being themselves a shield against rust.

There are several types available. Rust-Ban 343 is a semi-fluid type particularly suited to dip applications to molds which are to be stored either indoors or out. Although designated as semi-fluid, Rust-Ban 343 can be poured at normal room temperatures. It may be heated for ease of application where desired. Usual application is by dip, brush or swab. Coverage on dip application approximates 200 square feet per gallon. It is said to afford metals excellent resistance to the effects of humidity and acid fumes, as well as to rain, sunlight and salt spray.

Another coating suitable for use in the rubber industry is Rust-Ban 347, a semi-fluid which has a pour point above normal room temperatures and requires heating for dip application.

Alsifilm

THE name "Alsifilm", a contraction of aluminum silicate film, has been given to coherent, self-supporting, flexible films and filaments produced from suitably prepared gels of certain inorganic materials, including clays, of which bentonite is an example. Dr. Ernst A. Hauser, Associate Professor of Chemical Engineering, and a group of associates at the Massachusetts Institute of Technology, are responsible for the investigations leading to the discovery of Alsifilm, the manufacturing and marketing of which has been turned over to the Research Corporation, 137 Newbury Street, Boston, Mass. Dr. Hauser recently told the story of the development before a meeting of the New York Group, Rubber Division, A.C.S.

When properly treated, Alsifilm has a number of unusual properties which suggest its value for numerous purposes. It may be made resistant to water, acids, alkalis and oils. It may be made transparent and crease-resistant and to take printing well. Its electrical properties are similar to those exhibited by sheet mica, which is probably the best insulator known.

Attention is being concentrated at the present time on the more fundamental aspects of the discovery of Alsifilm, such, for example, as the study of various ways of forming and conditioning the film, the determination of the most suitable raw materials, the determination of the physical, electrical and chemical characteristics, and similar problems. It is expected that steps will be taken toward production of the material on a commercial scale within the next few months.

Charles Goodyear

CONNECTICUT YANKEE AND RUBBER PIONEER

By P. W. Barker

CHAPTER 14

Goodyear in Europe

AFTER the sweeping legal victory at Trenton in the fall of 1852, Charles Goodyear considered the time ripe for exploitation of his vulcanization patent in Europe. He and his family sailed late in the year for Liverpool, England, on money which was presumably borrowed from brother-in-law De Forest.

Goodyear had anticipated obtaining $200,000 to $250,000 for the sale of his license in Europe, preferably to one party, the Macintosh Company. Charles Macintosh had died in 1843 and Thomas Hancock was senior member of the firm. There is every reason to believe that Goodyear and Hancock discussed rubber vulcanization and each other's claims in a temperate manner. Charles Goodyear, Jr., writing from London in 1852 to Cousin Austin G. Day, said of Hancock, "for I believe that had he controlled the matter himself alone, it would have been settled without difficulty long ago." Diplomatic promises were made by the English firm which were never fulfilled.

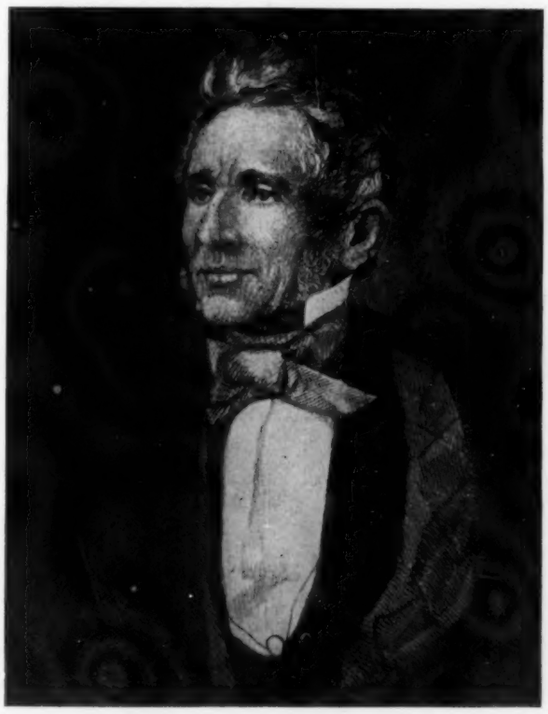
Took Out Several British Patents

In hope of securing some lawful protection in England, Goodyear took out a large number of British patents for the application of his vulcanized rubber to various products. None of these, however, resulted in giving the patentee reimbursement for his trouble and expense. Plans for organizing a rubber manufacturing plant in London under Goodyear's direction were made but they never materialized.

Wife of his youth, helpmate in all the real sense of the word, mother of his nine children, the true wife on whom Daniel Webster had used his best oratory at the Trenton trial, Mrs. Goodyear died in London on March 30, 1853. It was at a time when the inventor's luck was all of the poor variety, and when he was sick and hobbling about on crutches. His family was with him and consisted of Ellen, aged 28; Cynthia, 26; Charles Jr., 20; Clara, 13; and William Henry, aged 7 years. If his mind ever touched the bottom of despair, it did now.

Fourteen months after the death of Mrs. Goodyear, Charles was remarried, on May 30, 1854, to Fanny Wardell, of London. Why this girl, younger than his two eldest daughters and the same age as Charles Jr., 20 years, married Charles Goodyear will ever remain an unsolved mystery of the feminine heart. Goodyear was little more than a business failure, extremely ill and requiring the utmost medical attention, and he was 54 years of age.

This man despite his small height and physical infirmities had charm and personality. How many investors had he convinced of his ability to do the impossible for them with rubber? Fanny Wardell prob-



Engraving of a painting of Charles Goodyear on hard rubber panel done by Healy in 1855.

NOTE: This biography of Goodyear started in our April, 1938, issue.

Courtesy, U.S. National Museum
Oil portrait of Charles Goodyear, Jr., by Healy on hard rubber panel in Paris in 1855.

ably knew that she was doomed to nurse her older husband when she married him. Recalling their first meeting, she said, "I shall never forget the impression made on my mind by the melancholy in the first tones of his voice that ever fell upon my ears, as, leaning upon his crutches, he was first presented to me."

Hope lay ahead and in the month of November, 1854, Goodyear, his children, and the new Mrs. Goodyear, arrived in Paris. Another world fair was to be opened that month, Exposition Universelle, and he must show his wares to the French. Best specimens from his Vulcanite Court were brought to Paris as well as some manufactured by French firms. A more elaborate display than that of London was arranged, cost said to be in the neighborhood of $50,000, although fully $30,000 worth of materials were shipped from the old London display. It can be stated definitely, also, that Goodyear did not have $20,000 to spend at this time, and whatever cost went into preparations for the Paris fair was met by notes.

At this time he owed large sums to his brother-in-law, William C. De Forest, which he was unable to pay. There is every reason to believe that he even borrowed money to go to Europe, and that additional loans were required from time to time. Elapse of time is an exaggerating influence in the reckoning of costs. Hard rubber was the leading rubber product displayed, and Frenchmen were delighted with it.

Instead of one court as at London, Goodyear had two Vulcanite Courts at Paris. Exhibitors from the United States had obtained too large a space for their exhibits and Goodyear took twice his allotted space in order that there should be no blank walls in the United States section.

As an American or as a Frenchman?

A serious argument developed at this time. Should Goodyear exhibit as an American or a Frenchman? French rubber manufacturers, under his patent and direction, had made many of his specimens. So they decided to label his exhibit as the produce of France. Maunsell Bradford Field, from New York, President of the American Commissioners, finally appealed to Napoleon III, who ruled that Goodyear might exhibit as an American inventor if he wished to do so. And he most emphatically did. It was Field who told the story of the Emperor complimenting the Goodyear exhibit attendant for his rubber cannon balls. No one corrected the Emperor in his mistaken idea of footballs.

Most spectacular of the entire rubber exhibit were the portraits on hard rubber panels by George Peter Alexander Healy, a famous American portrait painter who was then in Paris. Healy did two large portraits in Paris in 1855 on hard rubber panels of Charles Goodyear, and it is from these portraits that we are able today to get an idea of the appearance of the great inventor.

First of these portraits is in the Goodyear display at the Arts and Industries Building, Smithsonian Institution, Washington, D. C., and it is definitely the first because this inscription is painted beneath the signature of the artist, in his own hand: "The first picture ever painted on India Rubber Panel." A second and identical portrait is in possession of the United States Rubber Company in New York.

Elaborately carved hard rubber front cover of what is believed to be the only completely rubber volume of Goodyear's own biography, "Gum-Elastic." The back cover of this volume also has a hard rubber panel, but of plain design. The book may be opened with ease only in about five places. Photo, courtesy of U.S. National Museum.

Front and back views of the gold medal awarded to Goodyear at the World's Fair in Paris in 1855.

Healy also did a smaller portrait of Charles Goodyear, Jr., and one of Daniel Webster, both on hard rubber panels, and both dated 1855. These portraits decorated the Paris Vulcanite Courts, and they also are in the Smithsonian collection. Charles senior and junior were done from life, but that of Daniel Webster from sketches or memory as he was not living at the time. Healy had painted a number of portraits of Daniel Webster, most famous being "Webster Replying to Hayne," which is in Boston and on which he labored over seven years.

Not so spectacular as the beautiful Healy portraits were the hard rubber objects: combs, pendants, canes, cases, fans, desk knives, and the now famous chatelaine. Goodyear presented the first hard rubber chatelaine to the Empress Eugenie, but the second was made as an exact duplicate for Mrs. Goodvear. Almost all of these objects may be seen today at the Smithsonian.

And in addition, there is the book—Goodyear's own biography, *Gum-Elastic*, printed on his patent rubber parchment and bound in beautiful hard rubber covers, the front elaborately carved. It is believed now that this rubber volume is the only one executed on rubber, and therefore the most remarkable rubber book in existence. It was originally ebony color, but today it is dark chocolate brown, having been subjected to fire and water in a New York fire early in 1901. These relics had been reposing since 1855 in a fireproof safe, but it was not watertight. As a result, they were submerged in water for days. Rarest of all things, the book was harmed most; so that today it may be opened with ease only in about five places.

Who Prepared the One Rubber Copy?

Who printed the paper copies and prepared the one rubber copy of this rare book, probably will always be a mystery. It is likely that David and Robert Haering, brothers, who were employed by Charles Goodyear for years in New Haven as printers and lithographers, did the actual printing. Austin Goodyear Day probably did the hard rubber covers of the volume, although the Brothers Haering also were familiar with hard rubber manufacture at time of publication. Ellsworth D. S. Goodvear had learned the printing trade early in life, and it is possible that he also had a hand in the printing of *Gum-Elastic*.

Gold Medals were awarded at Paris and Goodyear received one. He also received the Cross of the Legion of Honor. He was in Clichy Debtors' Prison, December 5, 1855, when the communication from the Emperor was received making him an Officer of the French Legion of Honor.

Reason for imprisonment was usual—inability to pay debts. He had received large notes from three French manufacturers in payment for licenses. When a favorable decision had been reversed by the French courts, makers of the notes refused to meet them. Goodyear had endorsed the notes to pay for building a "Monster" machine similar to that of Chaffee and to manufacture goods for his exhibit. As endorser he was held responsible and being unable to pay was finally lodged in prison.

At the time of his arrest, he was said to be suffering from gout and required the aid of crutches to walk. Only one night was spent in jail, Mrs. Goodyear managing to have him released the next day. On being asked how he had spent the night, he is supposed to have replied, "I have been through nearly every form of trial that human flesh is heir to, and I find that there is nothing in life to fear but sin."

1855, year of so much honor at Paris, was also the year of disaster for the inventor. He had been arrested on three occasions in Paris for debts, had lost a patent suit to Thomas Hancock in England, and had lost another suit in France. No wonder he was sick of it all and returned to England on December 21st. In London, in February, 1856, he had another, and the last, experience of being imprisoned for debt. Failure of United States licensees to pay fees due is given as the reason for his lack of funds, but the adverse patent decisions in England and France which

Reproduction of the famed hard rubber chatelaine given by Goodyear to Empress Eugenie.

deprived him of anticipated revenue were also very good reasons.

Sickness was added to his financial worries. He appeared to be at the very door of death, and he took leave of his family as though it were indeed farewell. Not until April 8th was he improved to the extent of being able to be moved from London to Bath. For nine weeks he was unable to move hand or foot. He remained two years in Bath rebuilding his health until May of 1858 when he sailed for the United States.

To the second Mrs. Goodyear is due the credit for nursing him back to life. Later she said that the last winter in England was "one of deep trial, constant sickness, acute bodily and mental distress, and great pecuniary inconvenience and anxiety. The history of that period can never be told."

Two children of Charles and Fanny Wardell Goodyear were born in England: Henry Wardell, on June 26, 1856, and Arthur, on May 30, 1858. Both of these boys died at the age of one, Henry Wardell in 1857 at Bath and Arthur in 1859 at New Haven.

(To Be Continued)

Rubber in Ship Construction

SEVERAL interesting examples of the use of rubber in modern ship construction were given by Herbert Christophersen in a paper on "New Uses for Rubber in Ship Construction," delivered at the annual meeting of the Society of Naval Architects and Marine Engineers, held on December 1-2 in New York City. He revealed that rubber is now being used as a protective covering for shafts exposed to the action of sea water, as a protective lining for salt-water piping, as a protective lining or covering for steel surfaces subjected to the corrosive action of sea water, as vibration and noise dampeners, as oil-resistant gasket material, and as a bearing material in strut and stern-tube bearings.

Protection Against Corrosion

As applied to shafts exposed to the action of salt water, rubber offers a protection to the steel shafts against corrosion and erosion to a degree which has been impossible to obtain in the past, according to Mr. Christophersen. By the use of rubber protective casings in conjunction with the conventional bronze bearing liner, the bronze liner need be only sufficiently long to give the proper bearing area and, thereby, a more efficient shrink-fit to the steel shaft can be obtained than with a combination bronze bearing and protective liner.

The speaker outlined several reasons why rubber was an ideal material for shaft covering, and then stated that rubber protective casings offer a considerable saving in cost and weight over the bronze liners. The saving in cost may be as high as 25%, and the reduction in weight from 5 to 20% of the complete shaft, depending on the diameter and length of the rubber casing.

Pointing out that an ever-present source of expense and trouble in all types of ships is the salt-water piping, since salt water in itself is highly corrosive to steel and to practically all alloys used for fire mains, sanitary and bilge lines, etc., Mr. Christophersen said that a remedy for these troubles is the use of rubber, which is absolutely resistant to any type of salt-water corrosion.

Furthermore, rubber, being a good electrical insulator, breaks up or prevents the generation and flow of electrical currents from any source, so that rubber-lined pipe not only is resistant to all corrosive action but gives considerable protection to connecting equipment, which may not be rubber-lined, simply by preventing the occurrence of galvanic action. Rubber-lined pipes are practicable on all salt-water systems where the constant working temperature does not exceed 180°F.

Rubber-on-Metal Advantageous

Rubber-on-metal can be used to advantage in many places on board ship, such as for protective lining in the water chambers of condensers as well as on tube sheets; as a lining for condenser intakes or in the hotwell; and as a lining or protective covering between the metal tank and the tile in swimming pools. In the latter instance, it can also be used as a decorative finish, in which case the tile could be dispensed with. A recent application has been the vulcanization of rubber matting with a special tread directly to the steel decks of ships, where a non-skid surface was required.

Referring to rubber vibration and noise dampeners, the speaker said there was a great need for these in connection with ventilating and blower systems, as well as on the smaller auxiliary units, such as pumps, motor generator sets, radio units, etc. He also made mention of that fact that while rubber has been used as gasket material aboard ship for many years, its scope of usefulness was severely restricted until the development of the so-termed synthetic rubbers. Oil-resistant synthetic rubber gaskets are now being used on even the largest hatches on modern tankers, as well as for manholes of fuel tanks.

Use of Bearings Reviewed

In concluding his paper, Mr. Christophersen reviewed the use of rubber bearings for ships, the use of which is steadily increasing due to the low coefficient of friction of wet rubber and its property of shedding grit. These properties combine to make rubber the ideal bearing material. When used in shallow waters where considerable sand is present, rubber bearings out-wear conventional bearings four to one. In any service, however, they outlast other types as long as they are kept wet. Rubber bearings also function as excellent noise and vibration dampeners.

Alcohol-Soluble Resins

THERMOSETTING resin oxidation products of rubber, with alcohol solubilities varying from 0 to 90%, may be obtained by milling crepe rubber with proper catalysts and dried wood flour, according to a recently-issued United States patent. The resins are said to be suitable for molding powders, varnishes or lacquers. The following example is given in the patent: If 100 parts of crepe rubber (catalyzed with 2½% cobalt linoleate) are milled with 100 parts of wood flour (100 mesh) for 30 minutes at 80 to 85° C., the following mixture of resins is obtained from the exothermic reaction: "A" resin, nil; "B" resin, 10%; "C" resin, 90%. "A" is reported to be soluble in naphtha but insoluble in alcohol and acetone; "B" is soluble in either acetone or naphtha, but insoluble in alcohol; while "C" is described as being soluble in both acetone and alcohol. By employing smaller amounts of wood flour, while keeping all other conditions the same, the yields of "A" resins may be increased, according to the patent.

Kautex— A Cork-Rubber Composition

A Description of Its Development and a Review of Its Current Applications and Future Possibilities

By David H. Forbes

FOR generations cork has been used in a most primitive manner for the insulation of buildings, cold storage and for numerous other purposes. Later developments suggested its application in the lining of refrigerators and in the manufacture of composition floors. With the advance of industry along both technical and mechanical lines, it is natural that present day engineers should turn to this valuable material to solve some of their perplexing difficulties.

While cork fulfills all the main requirements of insulation and resilience, poor mechanical strength and lack of pliability are its main drawbacks when used for jointing, packings, gaskets, etc. On the other hand, rubber, which finds several similar applications, possesses great mechanical strength but breaks down under compression and soon takes a permanent set.

By utilizing the little understood complex resins and structural nature of cork, however, with the addition of antioxidants and combinations of low-temperature accelerators, remarkable aging qualities have been developed in cork-rubber compositions. While not possessing the tensile strength of rubber, cork-rubber materials can replace it to advantage in numerous instances, particularly where low gravity, life, absence of permanent set, and electrical and frictional qualities are necessary.

One of the pioneers in this intriguing field of activity is the firm of Kautex (Plastics) Limited, of Elstree, Herts, England. This company, which markets a range of products known as "Kautex," is the exclusive user in Great Britain of the "Skipsey Process" of sesqui sulfur cold vulcanization, concerning which much has appeared in the technical literature in recent years. By this process the cork granules are not injured by heat during manufacture.

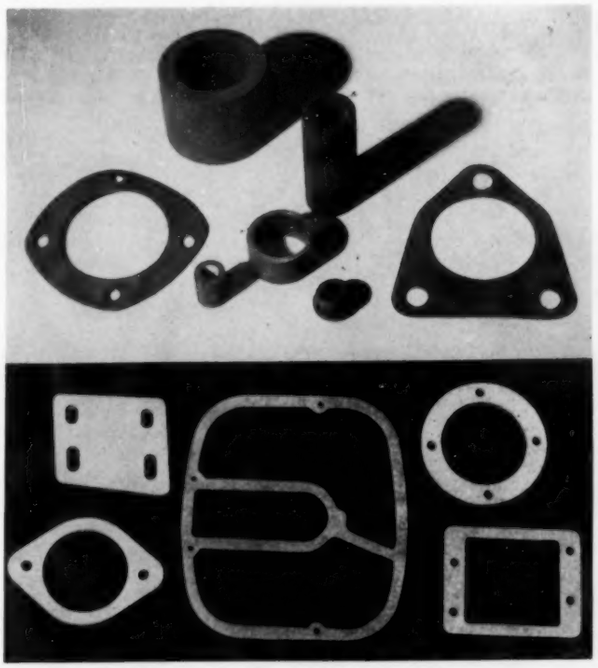
Heavier Than Agglomerated Cork

In comparison with agglomerated cork, using glue or resin binders, Kautex is of course heavier due to the rubber content, but to counteract this weight factor it possesses distinct advantages in mechanical strength, and is very adaptable as the composition can be varied to suit specific requirements. All gradings of cork are used in the various Kautex materials, fine screenings for smooth, hard surfaces, and coarser, larger granule sizes for such uses as road jointings. The material is in no way limited in its scope and versatility, which statement is proved by the fact that it is constantly replacing other materials.

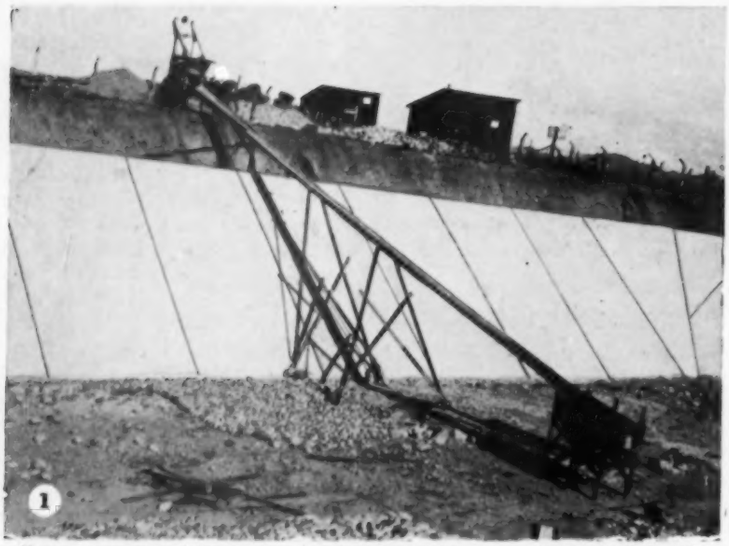
The original use of Kautex was as a packing and jointing material in place of rubber and rubber compositions. Since, however, British motor car manufacturers have adapted it for body-mounting and anti-squeak packings, while the aeronautical industry has put it to use in many ways. Aircraft engineers were quick to see the advantages of Kautex as a glazing strip for windshields and windows. Because this cork-rubber material does not take a permanent set and the high cork content is constantly expanding, thus preventing water penetration and rattle, it is superior to rubber or felt as a stripping material in this connection.

New Type Resistant to Greases

The development of the synthetic rubber-like materials led to the development in turn of an entirely new product of prime importance to the motor and airplane industries. This new product (or material) is manufactured by Kautex (Plastics) Limited under the name of "Neo-K-Tex." It possesses great resistance to oils and solvents, and is rapidly finding a ready use for all kinds of gaskets, grommets and oil seals, not only in the two fields mentioned, but in all kinds of industries.

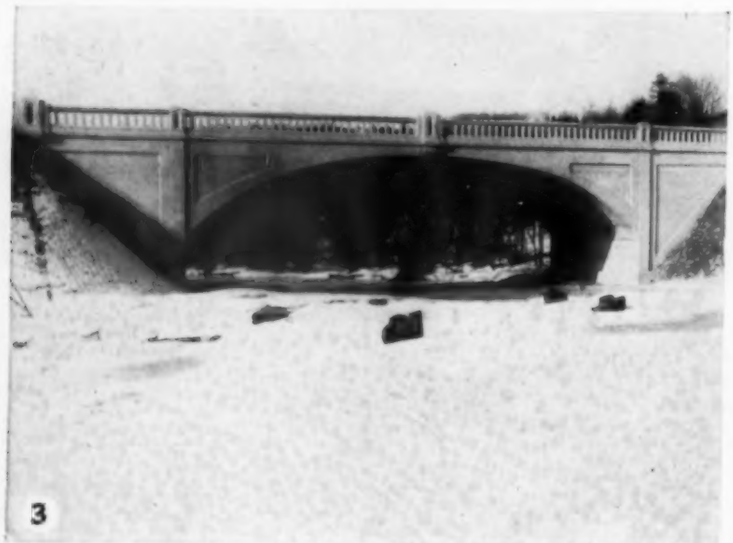


Neo-K-Tex packings and gaskets which have great resistance to oils and greases. Photos by courtesy of "Neoprene News."



Kautex expansion joints were placed every 30 feet around the sloping walls of this 2,500,000-gallon capacity reservoir, at Vernon, British Columbia.

Section of the concrete dam at Brewery Creek, Hull, Quebec, completed in 1938 by the Department of Public Works of Ottawa, using the Kautex joints.



Cork-rubber expansion joints were also used in building the Jones Creek Bridge in Kings County, N. B., constructed last year by public officials.

Neo-K-Tex was approved for use on aircraft in England after exhaustive tests were conducted by the Air Ministry. Other tests indicated that it has a frictional value of .7 when used as a motorcycle clutch lining as compared with the .5 exhibited by the usual types of linings. It is also being used as a motorcycle cylinder-head gasket, replacing the usual copper and asbestos materials, and has successfully met all engineering requirements.

Used for Covering Feed Rolls

One of the large potential uses of Neo-K-Tex is that of covering feed rolls in spinning mills, replacing leather and composition cork covered rollers. After long and careful experiments a grade of material has been produced with the correct co-efficient of friction and static absorption necessary for higher efficiency.

An interesting application of cork and rubber is its use as expansion jointing for concrete roads, bridges, dams and other construction work. For this purpose, Kautex is cut to length and width and supplied in thicknesses from ¼ to 1 inch. This jointing has a natural "concertina" action, which enables it to follow any movement of the road without extrusion. This latter point is of vital importance, since most bitumen, tar, latex or latex cement joints are squeezed out of position by the expansion or contraction of the concrete, leaving a gap that has to be replaced or refilled to avoid water penetration which may possibly turn to ice in winter.

Kautex has a number of advantages to offer when used as a jointing on concrete projects. It is non-extruding and non-spreading, thus eliminating the usual joint ridges. It withstands any temperature changes without shrinking or extruding, always holding tight to the concrete, thereby preventing the infiltration of foreign material including water. Since it is self-expanding in the presence of water or heavy moisture it is unaffected by water.

Furthermore, Kautex constantly maintains its elasticity, thus combining the essential characteristics of a good road joint—resiliency and durability. It is permanent and does not deteriorate with age. Because efficiency is maintained under service conditions without trimming or replacing, joints made of this cork-rubber material require little or no maintenance. The material is easy and clean to handle and to lay, coming as it does in strips of the required length and thickness and depth. The roughness of its surface forms an excellent mechanical "key" to bond with the concrete. Finally, it has the natural color of cork and therefore does not mar or disfigure the appearance of the road. This color angle is also important in other structural work on which the material is used.

In Use Throughout the World

Kautex joints have been laid on concrete projects in many countries. In Canada, for example, they have been used on the 2,500,000-gallon reservoir at Vernon, British Columbia;

reservoirs at Scarborough and Kitchener in Ontario; the Brewery Creek Dam at Hull, Quebec; the seawall at Ste. Anne de Sorel, Quebec; and the Beaver Dam Bridge, New Brunswick, as well as the Coac, St. Margaret's, Jones Creek, Sussex and York Mills bridges in the same province. They have also been used on the concrete road in Ste. Angele de Laval in Quebec where they are still in perfect condition despite the severe temperatures experienced in that region.

Cork-rubber compositions have a variety of applications outside of the fields already mentioned. As a flooring material, for instance, it is resilient, silent, yet very comfortable to the feet. It retains its shape indefinitely and does not "creep" in the same way as rubber. When sanded, the coloring has a very pleasing effect, and its use in public buildings is increasing rapidly due to its abrasion resistance.

The boot and shoe industry has adopted another composition of cork and rubber for its specific needs. Here the advantages of lightness, non-skid and resilience come to the fore, and it is used for slippers and beach sandals. The particular grade of Kautex used by the boot and shoe industry is produced so that it can be sewn or cemented as desired.

Replacing Rubber In Handles

The sporting goods industry of England is using Kautex in place of rubber in the handles of cricket bats and hockey sticks, having determined that it better takes up and absorbs the shock of contact. It has occurred to the writer that baseball bats would also benefit by the use of this cork-rubber material. Another type of composition is made for use as an underlay on golf club handles, and still another for use on tennis and badminton rackets. In all these instances, the cork-rubber material gives a comfortable non-slip grip.

A recent development in the cork-rubber field has been the coating or impregnation of gasket material with a solution of an alkylene polysulphide. This makes for a solvent and mustard gas-proof material. Paper or fabric coated with this solution has a permeability of about 5 while remaining plastic and remarkably resistant to sunlight, ozone, oxidation, oils and solvents. The solution, or dough, is easily handled and can be thinned for dipping. The cure is simple and requires little equipment other than that used for rubber proofing or dipping work.

Development Work Continuing

These are but a few of the many applications to which cork and rubber compositions have been put. They are, however, indicative of the fact that the use of cork as a compounding material has given development engineers an opportunity to put many theories into practical use.

It should also be stated, in conclusion, that mixtures of cork and rubber are generally prepared to meet definite uses. Ground leather, asbestos fibre, wood flour, and graphite are some of the materials incorporated into mixes to form compounds to meet such special requirements. The cork and rubber mixes take readily to these additional ingredients.

Section of the concrete road at Wingham, Ontario, which made liberal use of Kautex road joints, completed in 1937 by the Towland Construction Co.

Installing cork-rubber expansion joints in the concrete road at Wingham, Ontario, indicating the simplicity with which these joints may be laid.

The rough position of Kautex joints during process of installation may be seen on the left while the arrow at the right points to the completed job.

New Equipment

Repairing Broken Roll Necks

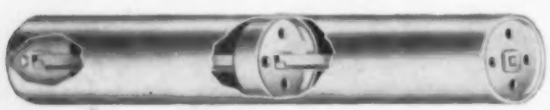
A METHOD of repairing broken roll necks by means of a special foundry burning technique has been developed by the Fulton Foundry & Machine Co., Cleveland, Ohio. From two to five tons of Meehanite Metal, a product borne of research by the Meehanite Research Institute of Pittsburgh, Penna., are

The repaired back refiner roll reproduced above is indicative of the successful application of the Meehanite process.

used for each roll in order to make a good fusion to the roll body. The fusion is carried out at a temperature slightly higher than the melting temperature of the parent metal in the rolls. The union is said to be so complete that after grinding no dividing line is visible. The accompanying photograph shows a repaired back refiner roll used in a rubber reclaiming plant. It has a 24-inch diameter and a 36-inch face and is used in conjunction with a somewhat smaller front roll. In operation, these rolls create pressures of from 90,000 to 110,000 pounds on each neck or journal. Bearing temperatures often reach 300° F. due to friction resulting from a differential in speed of the rolls, usually three to one. In the foreground of the photograph is seen the broken roll neck which was successfully replaced by the fusion process. This process is said to have been successfully applied to 60-inch and 84-inch mill rolls, various refiner rolls, warming mill rolls, and many other types.

All-Steel Calender Stock Shell

A NEW all-steel, all-welded calender stock shell, which is said to show a marked improvement over other models, has been placed on the market by the W. F. Gammeter Company, Cadiz, Ohio. The entire construction is of steel, welded throughout, with



forged steel hubs, hardened to insure long life. The vent openings in the heads are sufficiently large to receive conveyor hooks. The unique construction makes for a strong, sturdy, trouble-proof calender stock shell.

Abrasive Wear Testing Outfit

A COMPACT outfit for accurately evaluating resistance to rubbing abrasion has been introduced under the name of the Taber Calibrated Abraser Wear Testing Outfit by the Taber Instrument Co., North Tonawanda, N. Y. Its range of application includes practically all painted and lacquered surface finishes, rubber, synthetic resins, vitreous enamels, gold, silver, nickel and chromium electroplate. The abraser conforms to the best standard accelerated testing practice, as the calibrated wheels alternately cross-rub back and forth over a circular path approximately 2 square inches in area, producing a wear action similar to that occurring under actual service conditions. The wear is continuous and at a practically constant rate due to design and coordination of the factors involved in the test. A powerful dual blower provides cool streams of air for both motor and rotating holder, effectively preventing heating of the test specimen. The end point of the test for coatings is when penetration of the film is first observed, or in the case of solid materials, the test is continued to a depth of .0010 to .0050-inch. Accurate measurement of the wear depth to the nearest ten-thousandth of an inch is taken with suitable micrometers, and the wear per mil calculated.

Torque Motor Operated Brake

A NEW torque motor operated brake for alternating current service on elevators, cranes, hoists and similar installations, has been announced by Cutler-Hammer, Inc., Milwaukee, Wisconsin. It is designed for applications where positive, quick, "cushioned" braking is required for stopping or holding a load. A torque motor, operating through a simple anti-friction ball jack, releases the brake. When the brake is fully

released, the torque motor is stalled across the line. When the circuit is opened, the heavy, helical torque spring sets the brake. A slight flywheel action of the rotor provides smooth, cushioned braking. The new brake is available in five sizes, providing maximum torque ratings of 160, 400, 800, 1,600 and 3,200 pounds per foot on intermittent duty. Some of the operating advantages claimed for the new brake follow: Smooth, quiet, efficient operation on alternating current; large lining area resulting in low unit area pressure and longer lining life; individual shoe adjustment to compensate for wear; adjustable torque; and arranged for easy accessibility and maintenance.

Wellman Sole Cutting Machine

ESPECIALLY designed to meet the demand for a machine capable of cutting heavier stock with the same facility displayed by those cutting lighter stock, the Wellman Company, Medford, Mass., has introduced a Heavy Duty Sole Cutting Machine. Like the

company's other models, the new machine is made to cut rubber soles and taps with a beveled or straight edge. The bevel may be from 27° to 90° as desired. The new cutter is capable of producing an output of from 7,000 to 10,000 soles per day, which compares with a possible capacity of 1,200 soles per day by the hand cutting method. Soles which are mechanically cut are naturally more uniform, particularly with respect to the beveled edge, than are those made by other methods. The Wellman Company has been producing sole cutting machines for over fifty years. Its machines are used extensively not only in the United States but also in many foreign countries. The new Heavy Duty model is already on the market and is reported to be giving general satisfaction.

"Select-O-Speed" Transmissions

FEATURING hand wheel control, a new series of "Select-O-Speed" Transmissions has been announced by the Ideal Commutator Dresser Co., 2027 Park Ave., Sycamore, Illinois. These new models supplement the standard line from fractional to 7½ h.p. capacity that are equipped with lever type control. The

hand wheel is recommended where finer speed adjustments and smaller increments of speed are necessary. By turning the wheel only a partial turn it is easy to change the speed only a few revolutions per minute, according to the manufacturer. The new type of control is said to be especially desirable for installations requiring remote control. A few simple adjustments permit the point of control to be taken to a more convenient location. Hand wheel control is available on the company's variable speed transmissions in sizes from 1½ to 7½ h.p. capacity.

Clark Carloader

THE Clark Carloader is the name of a materials handling machine of radically new design developed by the Clark Tructractor Division of the Clark Equipment Co., Detroit, Michigan. Especially adapted to moving bagged materials, the new truck is 38 inches wide and pivots on one wheel, enabling it to operate in cramped quarters. The driver is mounted on top of

the machine, with all controls conveniently located. He has clear vision of his pick-up and is amply protected by the hoist uprights. The forks pick up any load with as much as two inch underclearance. There are eleven models of the Carloader available, with capacities up to 3,500 pounds and tiering limits up to 108 inches. All models carry their burdens at speeds from 1 to 7 m.p.h.

Weaver Wheel Counterbalancer

A NEW type of dynamic counterbalancer device, which enables automobile wheels with the tires mounted to be balanced both statically and dynamically, has been perfected by the Weaver Manufacturing Company, of Springfield, Illinois. A ¼ horsepower motor drives a horizontal shaft equipped with a counterbalancer weight which may be moved lengthwise of the shaft or rotated around it by means of two separate hand levers. The spindle which accommodates the wheel is mounted on a central pivot that permits the shaft to oscillate in the event any unbalance is present. After the wheel is in place, the shaft is disconnected from the motor assembly by means of a clutch. With the shaft free to rotate, the heavy side of the wheel swings to the bottom. After compensating for this static unbalance by applying weights to the wheel in the usual manner, the clutch is slipped in and the motor started. If the wheel is dynamically out of balance, an indicator hand vibrates. The two hand levers referred to which actuate the counterbalancer weight are moved forward and backward until the pointer stops oscillating. The position of the handles indicates the approximate weight to apply to secure perfect balance.

An Index to Vol. 44 of THE RUBBER AGE appeared in the April, 1939, issue. Additional copies available on request.

Book Reviews

Colloidal Phenomena. By Dr. Ernst A. Hauser. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York City. 6 x 9 in. 249 pp. $3.00.

Aptly sub-titled "An Introduction to the Science of Colloids," this book accomplishes the author's purpose by acquainting the reader with the modern viewpoints in colloidal science and shows where and why they must differ from those so successfully applied in physicochemistry. It is based on notes which have been used as text for the regular classes in colloid chemistry and physics taught by Dr. Hauser at the Massachusetts Institute of Technology. Particular emphasis is laid on the importance of the form and shape of matter in the field of colloids and the peculiarities of the colloidal state which will clearly distinguish them from systems in other degrees of dispersion. Naturally, no discussion of colloidal phenomena would be complete without reference to the colloidal state of rubber, and the author briefly discusses work accomplished to date on X-ray patterns. The book has 17 chapters, is complete with subject and author indexes, and contains a bibliography of textbooks on colloid chemistry.

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Wheels of Fortune. By Sir Arthur Du Cros. Published by Chapman & Hall, Ltd., 11 Henrietta St., London, W.C. 2, England. 5½ x 8½ in. 316 pp. 10s 6d (approximately $2.65).

When William Harvey Du Cros, sponsor of one of the world's first pneumatic tire companies, died he expressed a wish that the story of the invention and growth of the pneumatic tire industry should be written. This book, written by his son, Sir Arthur Du Cros, based on papers which came into his possession, and personal observations, is an answer to that wish. It not only traces the history and development of the pneumatic tire, but gives the biographies of those associated with them. The parts played by Thomson, Du Cros, Dunlop, Welsh, Bartlett, Golding, and numerous others, are clearly defined. The legal difficulties encountered by the respective inventors are also detailed. The volume has 22 chapters, a complete index, and contains a number of historical illustrations.

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Chemical Industries. (13th Edition). Printed in Great Britain. Available from Chemical Publishing Co. of N. Y., Inc., 148 Lafayette St., New York City. 8½ x 11 in. 380 pp. $4.00.

The latest edition of this book, which is actually a reference work of essential chemical facts and data, as well as a directory of the chemical process industry of Great Britain, has two main additions to the subject matter, *i.e.*, several tables of chemical symbols and abbreviations have been included and a description of new products has been added to the dictionary of raw materials for the paint and allied industries introduced last year. It is divided into ten sections, easily reached by means of tabs, as follows: Materials of Construction; Power Plant; Chemical Plant; Size Reduction; Separating; Handling; Instruments; Heavy Chemicals; Fine Chemicals; and Tables.

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Dictionary of Scientific Terms. (American Edition). Compiled by C. M. Beadnell. Chemical Publishing Co. of N. Y., Inc., 148 Lafayette St., New York City. 4¾ x 7 in. 235 pp. $3.00.

Although termed a "dictionary," this is actually a book of reference based on notations taken from recently published scientific books and from articles in scientific periodicals. The author has selected those terms which are most likely to call for inquiry on the part of students and others and in the case of many words has provided a fuller explanation than the somewhat terse one given in most dictionaries. A unique feature of the book lies in the numerous cross-references, synonyms and antonyms which enable users to quickly discover words of similar, related and opposite signification.

British Plastics Year Book—1939. Published by Plastics Press, Ltd., 19/23 Ludgate Hill, London E.C. 4, England. 6½ x 9¼ in. 584 pp. 15s (approximately $3.75).

This latest edition of the handbook and guide to the plastics industry in the United Kingdom is divided into nine sections, as follows: Editorial, Names and Addresses, Proprietary Names, Materials, Plant and Equipment, Manufactured Products, Associations, Who's Who in the Plastics Industry, and Statistical Data. A résumé of the materials available in the plastics industry, the first in four years, is given in this edition. One improvement found is a list of patents taken out in the industry in recent years, presented in tabular form. The book is tabbed for easy reference.

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International Business Directory. Published by the Institute for Research in Biography, Inc., 205 East 42nd St., New York City. 7 x 8¾ in. 320 pp.

This book, a first edition, contains a geographical arrangement, by city, state and country, of the 14,830 industrial and financial leaders whose biographies are included in the 1938 edition of "Who's Who in Commerce and Industry, The International Business 'Who's Who'." It is designed to enable the user to quickly ascertain the names, principal positions and addresses of the foremost business executives in various countries, whose more detailed biographies are included in the International "Who's Who." A number of executives of rubber companies are included in the edition.

Booklets, Catalogs, etc.

A Few Corrections of the Statistical Theories of the High Elasticity of Rubber. By R. Houwink. Published by the Rubber Foundation of Holland, 182 Heerengracht, Amsterdam, Holland. 6¼ x 9½ in. 12 pp. (A limited number of copies are available from THE RUBBER AGE.)

Taking issue with the theories that rubber-like high elasticity is always associated with the presence of chain molecules and that when rubber is elongated no attractive forces are broken down and no valence angles are deformed until an elongation of about 350% is reached, Dr. Houwink sets out to prove in this booklet that high elasticity not only occurs in compounds with chain-like molecules but also in matter consisting of three-dimensional molecules. If his conclusions are correct, they are of great importance to obtaining a better insight into the molecular changes during the elongation of highly polymerized substances. The booklet is an excerpt from a paper read by the author before the Deutsche Kautschuk Gesellschaft, held in Hamburg last year, and is translated from a recent issue of the *Zeitschrift fur physikalische Chemie.*

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Isolac. (Report No. 39-2). By Alfred J. Northam. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼ x 9¼ in. 12 pp.

The properties, general characteristics, compounding characteristics, and applications of Isolac, a thermoplastic derivative of crude rubber having balata-like properties, are given in this report. The new material can be added to rubber compositions requiring unusual toughness and stiffness at normal temperatures, according to the report, which includes several formulas indicating its effect on the stiffness and hardness of unloaded and heavily loaded stocks.

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Farm Guide Book. Firestone Tire & Rubber Co., Akron, Ohio. 3¾ x 6½ in. 72 pp.

Made up in handy pocket size, this guide is completely indexed and lists over 100 subjects of interest to farmers. Included are weight and measure tables, rules for planting fruit trees, method of calculating number of tons of hay in a mow, and number of pounds per bushel of different farm products. There is also a 12-month account section for farm income and expense records. Firestone products for the farm are described and illustrated throughout the guide.

Field Transport of Cane on Steel and Rubber. By L. A. Tromp. British Rubber Publicity Association, 19 Fenchurch St., London, E. C. 3, England. 5½ x 8½ in. 32 pp.

While the text of this booklet, reprinted from a recent issue of the *International Sugar Journal,* is mostly confined to the transportation of sugar cane, the rubber applications described cover a wide field and should prove of interest to growers of sugar beet, potatoes and market garden crops, as well as to the rubber plantation industry itself. The booklet, which gives data on rubber-tired animal-drawn and tractor carriers in the sugar cane industry, is the ninth of a series of bulletins on the use of rubber in agriculture sponsored by the British Rubber Publicity Association. Copies of this booklet may be secured from the Crude Rubber Development Bureau, 820 Munsey Building, Washington, D. C.

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Commodity Exchange—Its Functions and Activities. Commodity Exchange, Inc., 81 Broad St., New York City. 6 x 9 in. 48 pp.

By far the greatest volume of trading in commodities is executed on futures markets, yet a surprisingly large number of interested parties are not fully aware of the difference between cash and futures dealings. This booklet describes and clarifies the workings of a futures market and its purposes, as exemplified by the markets on Commodity Exchange, Inc. The booklet is divided into two sections, the first devoted to an explanation of the functions and activities of the Exchange's futures markets and the second to the various commodities traded on the Exchange.

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Rex-Weld and Rex-Tube Flexible Metal Hose. (Catalog G-14). Chicago Metal Hose Corp., Maywood, Ill. 8½ x 11 in. 40 pp.

Illustrations and engineering data on Rex-Weld corrugated metal hose, Rex-Tube asbestos packed hose and other types, and couplings recommended for each type, are contained in this new catalog. The catalog features a "New Products" section in color, bound into the center of the book. This section includes descriptions of the company's new diesel exhaust hose, new type hose for oil connections which utilizes a multiple cellulose sheet seal over flexible metal core, and stainless steel bellows.

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Viscositeit en Oproomcapaciteit van Latex. (Viscosity and Creaming Capacity of Latex.) By J. W. van Dalfsen. Ruygrok & Co., Batavia, Java, N.E.I. 7¼ x 10½ in. 28 pp.

Although published in Dutch, this booklet, a reprint of the article which appeared in the February, 1939, issue of the *Archief voor de Rubbercultuur,* contains a complete summary in English. In addition, all captions under charts, graphs, tables and illustrations are printed in both Dutch and English. In the author's opinion, the average creaming capacity of latex is higher when the viscosity is lower irrespective of the method of pre-treatment.

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Shell Carbon. R. W. Greeff & Co., Inc., 10 East 40th St., New York City. 6 x 8 in. 4 pp.

The average analysis of Shell Carbon, a finely divided carbon black consisting of spherical and oval shaped particles of a black gray color, is given in this bulletin, together with some of its outstanding characteristics. A number of claimed advantages exhibited by rubber products containing this relatively new material is also given. Use of Shell Carbon in the manufacture of mechanical rubber goods, tires, tubes, boots and shoes, wire and cable, and other products, is suggested.

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Lest We Regret. Travelers Insurance Co., Hartford, Conn. 6 x 9 in. 36 pp.

A comprehensive analysis, based on official reports from the 48 states, of the facts about automobile accidents in which 32,000 persons were killed and more than a million injured last year is given in this booklet. In addition to the statistical analysis, the booklet introduces a new and unique concept of driving danger in terms of "Danger Units." A discussion of the high cost of fast driving is also included.

Static and Dynamic Properties of Rubber Under Compression. By C. W. Kosten. Rubber Foundation, Heerengracht 182, Amsterdam, Holland. 6 x 9½ in. 28 pp. (A limited number of copies are available from THE RUBBER AGE).

This booklet is a reprint of the paper delivered by the author at the Rubber Technology Conference held in London last May, and appears in the printed "Proceedings." It assesses the constants governing the efficacy of vibration insulating materials and discusses the elastic behavior of rubber under compression, the latter in general terms. The author gives the results of measurements, statically and dynamically, of Young's modulus and of internal friction, and examines the relations between these magnitudes. A number of inferences are drawn from his examination.

General Catalog. George Scherr Co., 128 Lafayette St., New York City. 6¼ x 9¼ in. 32 pp.

The complete line of machine tools, instruments and machinery handled by the company are illustrated and described in this catalog. Included are several items being shown in this country for the first time, such as a bore inspection telescope for inspecting interior surfaces of tubes, pipes, forging, etc., and a sine bar level protractor which measures to 1 minute of arc. Manufacturers of hard rubber products especially will be interested in the catalog.

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Precision Measuring Tools. (Catalog No. 30.) Van Keuren Co., 12 Copeland St., Boston, Mass. 6 x 9 in. 28 pp.

Data on a new light wave measuring device, an improved light wave micrometer, high speed steel measuring wires, and other recent developments of the company, is included in this catalog. In addition, it contains reference tables for using gear wires, a table of coefficients of expansion, and a reprint of the complete specifications on measuring wires as set forth in the report of the National Screw Thread Commission.

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1939 Year Book of the Tire and Rim Association. Published by the Association, 1401 N.B.C. Building, Cleveland, Ohio. 8½ x 11 in. 115 pp. $2.00.

The latest standards and recommendations agreed upon after extended tests and calculations by the technical experts of various tire, rim and wheel manufacturers for rim contours which best provide proper tire mountings are given in the 1939 edition of the tire and rim year book. As usual, data given covers passenger cars, trucks and buses, airplanes, motorcycles and industrial vehicles.

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DeVilbiss Hose. (Catalog HD). DeVilbiss Co., Toledo, Ohio. 8½ x 11 in. 24 pp.

This illustrated catalog, which contains full information on the company's complete line of hose for all requirements, traces the product from the baled crude rubber through the hose factory and testing laboratory to its various finished forms. Specifications are listed with each type of hose illustrated, as well as data designed to aid the user in selecting the right type of hose for the performance desired.

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Crane Research Laboratories. Crane Co., 836 South Michigan Ave., Chicago, Ill. 8x11 in. 48 pp.

An explanation of the research activity which lies behind the manufacture of Crane valves, fittings, plumbing and heating equipment, and pumps, is given in this booklet. Replete with illustrations indicating apparatus and methods employed, this booklet should prove of interest to purchasers of the equipment mentioned.

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Stearns High Duty Magnetic Clutches. (Bulletin 225). Stearns Magnetic Mfg. Co., Milwaukee, Wisconsin. 8½x11 in. 16 pp.

The various types of high duty magnetic clutches and combination clutch-brakes made by the company are illustrated and described in this latest bulletin. Such data as design features, friction member, adjustment and applications is included. Specifications are also given.

Editorial Comment

Two Barter Problems

NOW that Great Britain has agreed to open negotiations with the United States for bartering American cotton and wheat for rubber and tin, a sound program should be formulated within a reasonably short time. Because both the existing rubber and tin regulation schemes provide all the necessary mechanism for preventing fluctuations in prices, there should be no hesitancy in carrying the program out promptly. British rubber producers have expressed some trepidation with regard to the possible dumping of the proposed accumulation of crude rubber in this country on the market at some future date, but their fears are being rapidly assuaged.

There seems to be two major questions to iron out before actual bartering may proceed: (1) How can Great Britain take more than a limited amount of cotton? (2) Where will Great Britain store the wheat reserves and how can they be kept from deteriorating? These two problems, insofar as rubber and tin are concerned, have already been solved in this country. Certainly Great Britain can solve them with equal ease. Although notoriously slow-moving, we suspect that diplomatic channels will hasten Great Britain's decisions.

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More Stock Wanted

THE question of available stocks of crude rubber in the United States continues to occupy the attention of American rubber manufacturers. Several of them are quite concerned with the present situation, insisting that permissible shipments under restriction quotas are not sufficient to provide for any unforeseen emergency. According to a survey recently completed by the Leather and Rubber Division at Washington, D. C., total domestic stocks declined from 262,200 tons at the end of 1937 to 231,500 tons at the end of 1938. The declining trend still continues at this writing.

That the State Department at Washington is giving heed to the fears of domestic rubber manufacturers is indicated by the fact that it has sent several notes in recent months to the International Rubber Regulation Committee asking for increased quotas. These notes have not had any apparent effect to date. Experts of the State Department are known to be considering advancing a suggestion to the Regulation Committee which would provide for shipments of rubber to this country outside of the quota, such shipments to be accumulated and held in this country under bond and to be distributed only in an emergency. This suggestion would in no way affect the current barter proposal made to Great Britain and the Netherlands to exchange cotton and wheat for rubber and tin. The idea has possibilities.

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N. Y. Group's Essay Contest

THE Prize Essay Contest recently approved by the New York Rubber Group, details of which are given elsewhere in this issue, should attract a number of papers. Far more important than the monetary awards, is the opportunity offered chemists under 35 years of age to prepare an original paper and have it presented before a reputable body of technologists. Recognizing the fact that all chemists may not have full opportunity to report original work or development results, the Contest Committee has wisely decided to give equal consideration to interpretive reviews of rubber literature pertaining to a particular phase of rubber technology.

The subject matter permitted under the rules of the contest covers so varied a field that practically any rubber worker or technical salesman can hit upon a suitable topic. As long as the paper is technical in nature, the subject may be on the properties of rubber, compounding materials or practices, processing methods, machinery or equipment, or some phase of rubber technology. Many young chemists harbor theories of their own. Here is an opportunity to put them on paper.

CURRENT • NEWS
of the Rubber Industry

MAY, 1939

TRADE COMMISSION CITES U. S. RUBBER

The U. S. Rubber Company and the U. S. Tire Dealers' Corp., a subsidiary, were ordered by the Federal Trade Commission on April 28 to discontinue price discriminations and payment of special commissions in marketing its tires in violation of the Robinson-Patman Act. The company had indicated a willingness to accept the cease-and-desist order a week prior to its issuance.

The order prohibits the sale of private brand tires to Montgomery-Ward, Atlas Supply, Western Auto Supply, Western Auto Supply Agency of Los Angeles, and the Arkansas Fuel Oil Company at net realized prices different and lower than the net realized prices at which the company's own brand tires of like sizes, grade and quality are sold to independent dealers. An exception is made to the extent that differentials are not prohibited which make only due allowance for differences in cost of manufacture, sale or delivery, if any, resulting from differing methods or quantities in which such tires are sold or delivered.

Further Practices Prohibited

Price discriminations are prohibited between different dealers by granting cumulative discounts dependent upon the total volume of purchases of the company's tires during a specific period and by granting to dealers, oil companies and others purchasing tires in large quantities certain discounts, commissions and rebates not allowed to smaller competing dealers. Sales of tires through retail stores owned or operated by U. S. Rubber at prices different and lower than charged to others is also prohibited, but in this connection U. S. points out that it has already disposed of all of its company-owned stores.

Finally, the company is prohibited from paying or contracting to pay to oil companies, such as Socony-Vacuum, Pan-American and Tide-Water Oil, a commission on tires purchased for resale to operators of oil and gas stations or to jobbers selling their products, unless such payment or commission is made available on proportionally equal terms to all other customers of the company competing with these oil firms in the distribution of U. S. Rubber's tires. According to the Commission's charges, the oil companies received as much as a 7½% "overriding" commission on such sales, while agreements for the payment of the commission were found to apply to sales made by U. S. Rubber to more than 2,800 service stations.

On April 27, after the cease-and-desist order had been served, F. B. Davis, Jr., president of U. S. Rubber, issued the following statement:

"When the complaint was issued in January we said that it has always been our aim to operate our business in strict accordance with the law. This is not always easy until the exact rules are laid down, because business in a country as big as the United States is a complicated matter.

"Now that the Federal Trade Commission has issued its order in this proceeding we expect as promptly as possible to make such changes in the operations of the Dealers Corporation and in its relations with customers as will accomplish the intention of the Federal Trade Commission and comply with the law as interpreted by the Commission. This can be done without disturbing our relations with any of our customers."

Must Make Periodic Reports

Compliance with the order is expected to result in U. S. Rubber's either revising its contracts or giving smaller dealers the price concessions heretofore reserved for quantity buyers. Federal Trade Commission officials have stated that their authority is limited to prohibiting discriminatory prices and they cannot determine what steps U. S. Rubber shall take to meet the terms of the order. U. S. Rubber, however, must submit periodic reports to show compliance with the order, violation of which would result in penalties.

Inventory Figures

Total inventory of the domestic rubber manufacturing industry at the end of 1937 amounted to $221,159,008, of which $123,725,802 represented finished products and $97,433,206 represented materials, supplies, etc. These figures compare with total inventory of $195,358,827 at the beginning of 1937, of which $102,445,068 represented finished products and $92,913,759 accounted for materials, supplies, etc. Total value of products for the rubber industry at the end of 1937 amounted to $883,032,546. These figures were recently released by the Bureau of the Census.

GROUP PLANS NEW TRADE ASSOCIATION

A new trade association to promote the scientific development and growth of crude rubber in Latin and South America is under discussion. The possible formation of the association, initiated by one of the smaller rubber manufacturers in this country, has been placed in the hands of Stewart N. Clarkson, president of Stewart N. Clarkson Associates, Inc., specialists in trade relations, of 420 Lexington Avenue, New York City.

Six Objects Are Cited

The objects of the proposed association are six-fold, as follows: (1) To promote and protect the interests of individuals, firms and corporations depending upon a supply of crude rubber as a raw material; (2) To promote measures to ensure an adequate and uninterrupted supply of crude rubber to the North American market; (3) To foster the scientific development and growth of crude rubber in the Western Hemisphere; (4) To promote the expansion of reciprocal trade relations within the Western Hemisphere; (5) To collect and disseminate information on crude rubber of value to members and the public; and (6) To cooperate with governmental and other agencies in effectuating the objects of the association.

Government Cooperation Assured

The plan, which calls for no investment of private capital, is to organize an association of the users of crude rubber in the United States whether they have 5 or 5,000 employees. Initially, the objects of the group would be promoted through encouraging research and development work on the part of the governments concerned. Administration officials have advanced a willingness to cooperate in this program, according to Mr. Clarkson, if an association truly representative of the large and small companies in the industry was behind the movement.

In order to crystallize some of the ideas which Mr. Clarkson has garnered in a recent tour of rubber factories, it has been suggested that a meeting of crude rubber users be held at some centrally located city, such as Cleveland, and a tentative date has been set for such a meeting in that city for Monday, June 12. All further information may be secured from Mr. Clarkson.

NEW ITEMS SHOWN AT 1939 TOY FAIR

Attracting one of the largest attendances in its history, the 1939 American Toy Fair, under the auspices of the Toy Manufacturers of the U. S. A., was held in New York City from April 17 to 29. As usual, the Hotel McAlpin was the center exhibit spot, while special displays were held at the various permanent showrooms maintained by manufacturers and jobbers in and about New York City.

Several new rubber products were on exhibit. The Sun Rubber Company showed its new line of molded rubber novelties fashioned after the characters which appear in *Gulliver's Travels*. A new drinking, sleeping, wetting rubber doll was also on display. Auburn Rubber exhibited its complete line of molded rubber toys, including complete sets of baseball players, farm yard characters, automobiles, etc.

Seiberling Latex Products Co. displayed a varied line of new rubber noise makers, inflated balls, sponge balls and miscellaneous characters. The company's famous line of Walt Disney novelties was also displayed. An ingenious display stand which is furnished with an assortment of inflated rubber balls was the main attraction in the exhibit staged by the Pennsylvania Rubber Co. Footballs, volley balls, soccer balls and basketballs, featuring the patented Weaver valve, were shown by the C. B. Webb Co.

Other rubber exhibitors at the Fair included Anderson Rubber Co., Lee-Tex Rubber Products Corp., Seamless Rubber Co., Barr Rubber Products Co., Paragon Rubber Corp., Ideal Novelty & Toy Co., Oak Rubber Co., and the Schavoir Rubber Co. Among new items were a Pliofilm wardrobe for dolls, a cat's head which mews upon rotation, toss-up balloons with wheeled platforms for pulling, and numerous molded novelties.

Highnote Rubber Formed

L. G. Highnote, formerly secretary-treasurer of the recently disbanded Bell Rubber Co., Inc., has formed the Highnote Rubber Company, with offices and factory at 1019 Pennsylvania Avenue, in Dallas, Texas. Mr. Highnote recently spent several days in Akron purchasing equipment for the new company of which he is sole owner. The firm will specialize in mechanical rubber goods for oil field use.

Swan Rubber Expands

Plans for an expansion program have been announced by the Swan Rubber Co., Bucyrus, Ohio. The program, which includes the construction of two new buildings, will add 11,000 square feet of manufacturing and storage space. M. G. Nussbaum, general manager of the company, said that the additional space is required to handle increased business.

Coming Events

May 22-June 8. World Automotive Engineering Congress, auspices S.A.E., New York, Indianapolis, Detroit and San Francisco.

June 6. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles.

June 10. New York Rubber Group, Annual Outing, Alps Castle, Preakness, N. J.

June 16. Akron Rubber Group, Annual Outing, Silver Lake Country Club, Akron, Ohio.

June 26-30. Annual Meeting, A.S.T.M., Chalfonte-Haddon Hall, Atlantic City.

Sept. 13-15. Goodyear Centennial Celebration (in conjunction with 98th Meeting of the A.C.S.), Boston, Mass.

Oct. 15. 40th National Automobile Show, Grand Central Palace, N. Y.

Oct. 16-20. National Safety Congress & Exposition, Atlantic City, N. J.

Dec. 4-9. 17th Exposition of Chemical Industries, Grand Central Palace, N. Y. C.

GOODRICH PLANT FOR CLARKSVILLE, TENN.

A new mechanical goods plant, which will employ several hundred workers when completed, will be erected immediately in Clarksville Tenn., by the B. F. Goodrich Company of Akron. Announcement of the plant was made last month by the Clarksville Chamber of Commerce and confirmed by Goodrich officials.

Contracts for the plant, which will cost approximately $1,500,000, will be awarded shortly. Decision to build it followed a two-year period of intensive study on industrial surveys, according to company officials. Clarksville is located 45 miles northwest of Nashville, is on the Cumberland River, and has a population of approximately 10,000.

Principal products to be made at the new plant will be heels and soles, belting, hose and packings, according to T. G. Graham, Goodrich vice-president, who also stated that it would be run on a 24-hour basis with three 8-hour shifts. He insisted that no tire production is intended in the new plant. The Clarksville electorate recently approved a $60,000 bond for the purpose of acquiring the factory site.

Arthur Kelly, production engineer at the Akron factory, has been selected to head the new plant as general superintendent. Mr. Kelly has operated factory properties for Goodrich in various locations and assisted in the survey which resulted in the selection of Clarksville as the site for the new mechanical goods plant. He will assume his new duties as soon as the plant is completed.

DIVISION REPORTS ON RUBBER CONSUMPTION

According to the annual survey conducted by the Leather and Rubber Division of the Bureau of Foreign & Domestic Commerce, Washington, D. C., a total of 438,000 tons of crude rubber was consumed in this country in 1938. The figure is noticeably higher than preliminary trade estimates, but represents a decline of 19.4% from the Division's estimate of 543,600 tons consumed in the previous year. Actual figures were reported by 435 manufacturers, the balance being estimated.

Included in the consumption figure of 438,000 tons is 16,161 tons of latex separately reported by 147 companies, and 710 tons of synthetic rubber reported by 110 companies. The latex consumption as reported was greater than the officially reported imports of 11,878 tons. Because many manufacturers known to be using latex or synthetic rubber in addition to crude rubber merely reported a single figure, the latex and synthetic rubber consumption figures are presumably incomplete.

The survey also indicated that total domestic crude rubber stocks declined from 262,200 tons at the end of 1937 to 231,500 tons at the end of 1938. Stocks definitely reported in the survey amounted to 208,985 tons, of which 112,196 was reported by 401 manufacturers and 96,789 tons was reported by 37 importers, dealers and brokers, the balance being estimated.

Consumption of reclaimed rubber in the United States during 1938 reached 120,800 tons, according to the Division's survey, which represents 27.6% of the amount of crude rubber consumed. This ratio is slightly below the 29.8% estimated for the previous year. Reclaim production for 1938 is estimated at 122,400 tons, while stocks on hand at the year-end amounted to 23,000 tons.

N. Y. Outing Planned

The annual outing and picnic of the New York Group, Rubber Division, A.C.S., will be held at the Alps Castle, Preakness (Paterson), N. J., on June 10. Tickets to members will be $2.75 and to non-members $3.75. Tickets may be secured from B. Brittain Wilson, c/o *India Rubber World*, 420 Lexington Avenue, N. Y. City and from P. P. Pinto, THE RUBBER AGE, 250 W. 57th St., N. Y. City.

A number of social and sporting events will be held and chairmen for the various events have been selected as follows: *Soft Ball*—V. A. Cosler (DuPont); *Golf*—G. H. Provost (U. S. Rubber); *Horseshoe Pitching* — Wm. Lamela (Okonite); *Tug-of-War*—G. R. Keating (Binney & Smith); *Fat Men's Race*—L. Edland (Vanderbilt); *Boochie*—James Carroll (R. E. Carroll Co); *Tennis*—R. Casey (Naugatuck). J. Miscall (Flintkote) will act as master-of-ceremonies, J. de C. Van Etten (Vansul) will have charge of the beer, and P. Murawski (DuPont) and P. P. Pinto (THE RUBBER AGE) will handle the prizes and tickets at the door.

RUBBER COMPANIES HOLD FAIR PREVIEWS

The week prior to the official opening of the New York World's Fair on April 30 was marked by previews and special dedications held by most of the larger exhibitors. Included among these previews were those staged by Goodrich, Firestone and DuPont. A brief report of these special events is being made herewith, but a complete story on the several exhibits of particular interest to the rubber industry, fully illustrated, will appear in our next issue.

Approximately 300 guests were taken to the Fair grounds by boat from East 53rd Street and the Hudson River in Manhattan on the evening of April 24 by Goodrich, where they were entertained at dinner and previewed both the stationary exhibits and the "automobile rodeo", which is a feature of the company's show. The "rodeo", with Jimmy Lynch, Texas racing driver, as the principal performer, is designed to stress the safe behavior of Goodrich tires at high speeds and under rough treatment. Goodrich officials acting as hosts at the preview included Col. David Goodrich, chairman of the board; S. B. Robertson, president; A. B. Newhall, executive vice-president; and J. J. Newman, vice-president.

Earlier the same day the DuPont Company played host to several hundred visitors at a preview of its exhibit called "The Wonder World of Chemistry." Guests were shown steps in the actual mixing of a neoprene compound on a laboratory mill and the vulcanization of neoprene rings of square cross section. Safety glass was demonstrated by releasing a half-pound steel ball from a considerable height, and while the ball shattered the glass the fragments held firmly together. Nylon, the company's new synthetic rayon, was also shown, as were numerous others of DuPont's synthetic materials.

Thursday, April 27, witnessed the Firestone preview. Guests were conducted through the modern tire factory, the American farmyard, the Firestone product hall, the reproduction of the company's plantation in Liberia, and listened to an explanation of how the singing color fountains operate. These fountains have been in operation at the Chicago World's Fair, the Great Lakes Exposition and the Dallas (Texas) Centennial last year. Important elements in the manufacture of tires are depicted by murals in the rotunda of the Firestone exhibition building.

BRITAIN AGREES TO BARTER NEGOTIATION

Great Britain has agreed to open negotiations with the United States for the exchange of rubber and tin for cotton and wheat. Prime Minister Neville Chamberlain informed the British House of Commons of this agreement on May 4. The announcement indicated that the British Government has accepted the principle of such transactions, although many difficult points must be ironed out before any actual bartering is accomplished.

If the barter proposal is put into practice it will assure the United States for the first time of ample war reserves of two essential raw materials, neither one of which is produced in this country. In addition, it will relieve the Government of approximately 20% of the huge cotton and wheat surpluses it now holds as collateral against advanced loans. It is proposed to exchange some 2,000,000 bales of cotton, the figure being based on the amount of rubber and tin the Army and Navy would require in the event of a European war.

No official word has yet been received from the Netherlands Government as to acceptance of the barter proposal. It is understood, however, that consideration to the proposition is being given not only in Netherland Government circles, but also among rubber and tin producers in the Far East. Although proposals of this type move slowly, early action is expected because of Great Britain's acquiescence.

Named Sole Distributor

An agreement has been completed between manufacturers licensed by the U. S. Rubber Company to weave "Lastex" shoe materials and the firm of Alfred Vamos, 47 West 34th Street, New York City, under which Vamos will hereafter be the sole distributor of these materials. This step was taken in order to protect shoe manufacturers and dealers against unauthorized and unsuitable elastic fabrics which have appeared on the shoe market, according to Mr. Vamos. As a further measure of precaution, all authorized and approved fabrics will hereafter be imprinted with the words "Vamos Lastex."

GOODRICH AWARDS KOROSEAL RIGHTS

Contracts covering the sale of a number of products made from Koroseal-treated fabrics have been concluded between Goodrich and several merchandising companies, according to word from Akron. Koroseal is the synthetic rubber-like material developed by Goodrich and technically is a plasticized polyvinyl chloride, the basic ingredients of which are coke, limestone and salt.

Among the companies receiving exclusive franchises were the following: Joseph A. Kaplan, New York City, *shower curtains;* Sunlite Corp., Milwaukee, Wisc., *table covers;* Richards, Boggs & King, Chicago, *raincoats, capes and umbrellas;* Kennedy Car Liner & Bag Co., Shelbyville, Ind., *raincoats, sanitary pillow and mattress protectors, and fan, typewriter and electrical and mechanical equipment covers;* J. F. Wall, Cleveland, *aprons;* McCreery Mfg. Co., Cambridge, Ohio, *miscellaneous items and novelties;* Royal Texture Co., Pittsburgh, *bags and food covers.* Other contracts are currently being negotiated.

Fabrics treated with Koroseal are rolled on regular rubber coating machinery. At present, all "Korosealing" is being done at the Goodrich plants in Akron. Among articles under consideration are straw, linen and fabric hats which, when treated with the synthetic rubber-like material, are said to remain fresh and unstained by dirt or water.

Thor Mold in Akron

The Thor Mold & Engineering Company, manufacturers of tire and other molds, which is headed by Ernest P. Engstrom, recently moved its headquarters to 321 Allyn Street in Akron.

Col. David M. Goodrich, chairman of the Goodrich Directorate, congratulates Jimmy Lynch, Texas auto daredevil, for his performance at the preview of the Goodrich exhibit at the New York World's Fair, while S. B. Robertson, president of the company (left) and Arthur B. Newhall, executive vice-president (right) beam their approval.

FINANCIAL NEWS

SEIBERLING OFFERS READJUSTMENT PLAN

A special meeting of stockholders of the Seiberling Rubber Company has been called at Akron on June 1 to vote on a plan for capital readjustment. The move comes as a sequel to the purchase and retirement of the company's entire funded debt of $2,350,000 last December. Purpose of the readjustment is to place the company in a position where it may be able to resume the payment of dividends in a reasonably short time.

The plan calls for an amendment to Seiberling's certificate of incorporation which will enable the company to issue new stock and to reclassify the present 8% preferred stock into shares of lower dividend rate. It is proposed to issue 34,000 shares of new no-par stock to be known as "prior preference stock," convertible into common stock and redeemable out of sinking fund at $50 per share. The stock would be cumulative as to dividends of not more than $2.50 per year.

According to the plan, the 50,000 shares of present 8% preferred stock, on which there are accumulated dividends of $70 per share, would be reclassified into $100-par 5% Class A cumulative preferred stock and $100-par 5% Class B non-cumulative preferred stock. The 35,255 of the 8% preferred which have never been issued would be reclassified into the same number of shares of 5% cumulative Class A preferred, while the 14,745 shares which have been issued and are outstanding would be reclassified as 5% non-cumulative Class B preferred.

An option would be granted to each holder of the present 8% preferred under the plan allowing him to continue as a holder of 5% Class B preferred or to receive 5% Class A preferred on a share-for-share exchange basis plus .4375 shares of 5% Class A preferred in payment of dividends accumulated on the present 8% preferred. Approval of 75% of the stockholders is required to put the plan into operation.

Monsanto Chemical Co.

First Quarter: Net income of $1,239,899, after all charges, equal to 88 cents a share on 1,241,816 common shares after deductions for preferred dividend requirements and minority interests. This compares with net income of $669,311, or 52 cents a share on 1,114,388 common shares, in the corresponding period of the previous year.

General Cable Corp.

First Quarter: Net loss of $196,773 after all charges, which compares with a net loss of $66,147 reported in the corresponding quarter of the previous year.

U. S. Rubber Co.

Sales of the United States Rubber Company for the first three months of the current year ran approximately 25% ahead of those for the corresponding period of 1938, more than providing for the quarter's preferred dividend requirements of $1,300,000, F. B. Davis, Jr., president of the company, told stockholders at their annual meeting held in mid-April in Jersey City, N. J. Mr. Davis said that tire departments are operating at near capacity and that the "Lastex" division is running at capacity and is behind on orders. The company expects to have more than $16,500,000 in cash at June 30 after meeting all charges and preferred dividend payments.

Baldwin Rubber Co.

First Quarter: Net income of $120,559, equal to 38 cents each on 316,757 shares, which contrasts with net loss of $31,675 last year. For the six months ended March 1, 1939, net income amounted to $277,402, equal to 87 cents a share, against $42,282, or 13 cents a share, a year before.

N. J. Zinc Co.

First Quarter: Net profit of $1,076,266, including $162,913 proceeds from patents and other income, equal to 55 cents each on 1,963,264 shares of common stock. This compares with a net profit of $652,596, or 33 cents a share, in the corresponding quarter of 1938.

Gillette Rubber Co.

For 1938: Net income of $761,843, equal to $3.81 each on 199,762 common shares, which compares with $320,336, or $1.60 a common share, reported for the previous year.

Hewitt Rubber Corp.

First Quarter: Net earnings of $41,573, equal to 25 cents a common share, which compares with earnings of $10,691, or 6 cents a share, reported for the corresponding quarter of the previous year.

Okonite Company

For 1938: Net loss of $205,483, which compares with net income of $538,527, equal after preferred dividends to $39.96 each on 12,000 common shares, in the preceding year.

Aetna Rubber Co.

For 1938: Net loss of $46,826, which compares with one of $22,888 reported in the previous year. The company was recently involved in a legal battle for control of the management.

Lima Cord Sole & Heel

For 1938: Net income of $40,511 which compares with $25,381 earned in the previous year. Fred W. Cook was recently elected president and treasurer of the company, while Alfred A. Curtis was re-elected vice-president and general manager.

Dominion Rubber Co.

For 1938: Net loss of $530,814 which compares with one of $222,205 reported for the previous year. Sales have picked up somewhat in the past few months and the company is expected to make a better showing for the first quarter of the current year.

Thermoid Company

First Quarter: Net profit of $65,150, equal after quarterly preferred dividends on 39,956 shares of $10-par stock, to 7 cents a share on 476,388 common shares. This contrasts with a net loss of $95,741 reported for the first quarter of 1938.

Anaconda Wire & Cable

First Quarter: Net loss of $77,161, after interest, depreciation, Federal income taxes, and other charges, which compares with a loss of $309,790 in the first quarter of 1938.

Bridgwater Addresses Group

Synthetic rubber could replace natural rubber if America's supply of rubber from the Far East should be restricted or cut off, according to E. R. Bridgwater, manager, Rubber Chemicals Division, E. I. du Pont de Nemours & Co., in an address on May 3 before the Chamber of Commerce of the United States in session at Washington, D. C. To prove his point, he cited numerous instances in which neoprene, DuPont's chloroprene rubber, has replaced rubber to advantage in the automotive, aircraft, electrical and petroleum industries. Referring to tires, he stated that no one yet knows the answer as to whether good tires can be made with neoprene. Mr. Bridgwater's remarks on neoprene were part of a discussion of methods of research management by which industrial research may be made profitable to corporations that engage in it.

Wiegand on Committee

In naming the members of the Goodyear Centennial Committee in charge of arrangements for the celebration to be held in Boston, Mass., on September 13-15, in our last issue, the name of W. B. Wiegand, director of research for the Columbian Carbon Co., New York City, was omitted. The full committee consists of John M. Bierer, as chairman, and W. B. Wiegand, A. A. Somerville, C. R. Boggs, G. K. Hinshaw and E. B. Curtis. The last two are ex-officio members.

Dr. A. A. Somerville Completes 20 Years of Service with the R. T. Vanderbilt Company

Blank & Stoller

DR. A. A. SOMERVILLE

Dr. A. A. Somerville, vice-president and head of the rubber department of the R. T. Vanderbilt Company, completes 20 years of continuous service with that company next month. Tremendous strides have been made in rubber technology in the past 20 years and many of the materials which are in use today, such as petroleum asphalt, various accelerators and antioxidants, soft carbons, and vulcanizing agents, were initiated or advanced by Dr. Somerville.

The progress recorded by this executive is so closely identified with the growth of the Vanderbilt Company that it is of interest to briefly review the history of the company itself since it was organized by Mr. R. T. Vanderbilt in 1916 when the sale of clay was started to the paper industry from offices located at 50 East 42nd Street in New York City. Mr. Vanderbilt had purchased the contracts of certain clay mines in the South which were later merged with others into the present North American Clay Company, one of whose products is the well-known "Dixie" clay.

Begin Marketing Materials

Vanderbilt's entrance into the rubber field was the result of circumstance. One of Mr. Vanderbilt's biggest customers, a paper manufacturer, had accumulated a surplus of by-product whiting, and Mr. Vanderbilt undertook to market it. Realizing the necessity of having a trained rubber technologist handle the sale of this and possibly other materials to the rubber industry, Mr. Vanderbilt acquired the services of Dr. Somerville, then associated with the U. S. Rubber Co. This move is believed to represent the first time that a technical rubber man was engaged to devote his entire time to sales work, a custom which has since become general practice.

The introduction of "Dixie" clay and whiting first occupied Dr. Somerville's time. The use of clay as a filler was far from popular at the time, but persistent pioneering effort introduced it into one plant after another where it gradually but steadily replaced other filler materials.

Hard Hydrocarbon, a blown petroleum asphalt made by the Standard Oil Co. of N. J., was another material introduced to the rubber industry by Dr. Somerville about this time. Up to then natural asphalts had been used exclusively and it was a long battle to displace them with a petroleum asphalt. Today, however, practically all of the oil companies are making similar grades and they are used almost exclusively.

Ultra-accelerators next occupied the attention of Dr. Somerville. Vanderbilt acquired the patent rights of S. Molony, had the manufacture of these products commercially developed, and successively proceeded to sell Super-Sulfur No. 1 in 1921, Super-Sulfur No. 2 in 1922 and Tuads in 1923.

In 1924 Vanderbilt became the selling agent for Thermatomic Carbon, a soft black. Although originally the material held no similarity to channel black, constant research resulted in the development of both the Thermax and P-33 grades which are now being used for special purposes. The process of manufacturing Thermatomic Carbon was originally developed as a process for manufacturing hydrogen by the cracking of natural gas with the by-product of carbon black. Research is still being continued to produce new and better grades of soft black from this unique process, the latest development of which is a stainless type of Thermax.

Other Materials Soon Added

Negotiations were started with the B. F. Goodrich Co. in 1925 for the manufacture and sale of antioxidants and Agerite Resin was put on the market the following year. Other grades were soon developed by Goodrich and today the Agerite family consists of 8 members which meet the demands of the rubber trade for this class of rubber chemicals.

In 1926 Goodyear named the Vanderbilt Company as selling agent for Captax, an accelerator which had been in use in the company's factories, and the rapid popularity of this low-temperature accelerator for tires definitely established Vanderbilt in the rubber accelerator business.

Selenium was the next material introduced (under the Boggs patents), followed somewhat later by Tellurium based on patents covering its use as a secondary vulcanizing agent. Since then other materials have been marketed, including Altax in 1930 and Butyl Zimate in 1934.

Commercial laboratory research has been a specialty of the Vanderbilt Company for the past 17 years. In 1922 Dr. Somerville displayed the business foresight which has marked his career by establishing a rubber laboratory at South River, N. J., a move which hardly seemed justified at the time. However, the laboratory was forced to move into larger quarters in Jersey City two years later and the continued growth of the company resulted in the construction of the present laboratory at East Norwalk, Conn., in 1928. Only three years ago the facilities of this laboratory were doubled by the addition of another building to provide space for the paper, paint, glass and ceramic departments.

In connection with the company's rubber activities, Dr. Somerville in 1931 started the *Vanderbilt News*, a technical magazine devoted to rubber matters and materials which has been issued regularly since on a bi-monthly basis and is known in rubber manufacturing circles throughout the world.

Biography of Dr. Somerville

Dr. A. A. Somerville was born in Milroy, Indiana, in 1883. Obtaining an A.B. degree from De Pauw University in 1905 he did graduate work at the University of Illinois the following year, and then went to Cornell University where he taught mathematics and where he received his Ph. D. degree in 1910. Joining the National Bureau of Standards in 1911, he resigned the following year to become associated with the India Rubber Co., and then followed five years in the development department of the parent U. S. Rubber Co., and a year in the mechanical goods department of the same company. During the war he represented U. S. Rubber on the War Service Committee and also served in the Rubber Section of the American Society for Testing Materials.

Dr. Somerville joined the R. T. Vanderbilt Company on June 1, 1919, as sales manager and was elected vice-president in charge of the rubber department the following year. He is a member of the A.S.T.M., A.C.S., American Physical Society, the Masonic Lodge, and the Cornell, D.K.E., Carmel Country, Gypsy Trail, and Quogue Field and Beach clubs. He was also one of the prime movers in the establishment of the New York Rubber Group.

Dr. Somerville's Hobby

Gentleman farming is Dr. Somerville's main hobby, and he may be seen any Friday afternoon on his way to his "farm" at Carmel, N. Y., where he takes great joy in raising prize fruits and feathered fowl of many kind. He points with pardonable pride to the fact that a photograph of a group of his fruit trees was recently used as an illustration in a commercial fruit grower's catalog.

Twenty years of activity in one industry is a major accomplishment. Twenty years of association with a single company in that industry is a remarkable achievement. Dr. Somerville is to be heartily congratulated on the occasion of his twentieth anniversary with the R. T. Vanderbilt Company.

R. I. CLUB HEARS TAYLOR AND YEAGER

Approximately 95 members and guests attended the spring meeting of the Rhode Island Rubber Club held at the Narragansett Hotel in Providence on April 21. C. W. Taylor, of Howe & French, Inc., and L. R. Yeager, of the Owens-Corning Fiberglass Corp, were the principal speakers. Before opening the meeting, Chairman Charles Berlow (American Wringer Co.) announced that cards had been made available by Wishnick-Tumpeer, Inc., and the L. C. Whittemore Co., for any members who wished to play bridge or other card games after the meeting.

Mr. Taylor, the first speaker, selected "Lacquer Applications and Reasons for Lacquering Rubber" as his subject. He stated that not only did the application of lacquer improve the sales appeal of a finished rubber product, but in many cases increased its resistance to sunlight and various solvents, particularly mineral oil. Lacquer can be applied to rubber surfaces by spray, spread, swab or dip processes.

Informing his listeners that close cooperation between rubber manufacturers and the lacquer manufacturer was essential to produce the proper finish for a particular product, especially with regard to the compounding ingredients and their amount, Mr. Taylor discussed some of the problems which his company had overcome. These included the preparation of special lacquers for overshoes and rubbers, where questions of elongation and abrasion were taken into consideration; for hose, where resistance to sunlight was a prime requisite; for ignition wire, in which case the lacquer proved to increase water resistance thus preventing voltage breakdown; and for use on innersoles and quarterlinings. Mr. Taylor displayed a number of samples.

The second speaker, Mr. Yeager, traced the development of fiberglass, and incidentally of the glass industry itself, telling of all the laboratory and production difficulties which faced the manufacturers before the present product was introduced on a commercial scale. He exhibited specimens of fiberglass in all of its several forms and wound up his talk by giving the present status of the industry and listing its limitations. Following his talk, he showed a motion picture which depicted the several processes by which fiberglass is made.

Ontario Hears Rupert

Approximately 50 members and guests attended the April 20th meeting of the Ontario Rubber Division of the Canadian Chemical Association, held at the University of Toronto, at which F. E. Rupert, of the Rubber Service Division of the Monsanto Chemical Company, was the featured speaker. Discussing "Modern Compounding and Processing in the Cable Industry," Mr. Rupert traced the history of the industry, told of compounding developments, and talked about present trends in the design of wire products. He also showed the Western Electric sound film on "Safeguarding the Speechways." At the business session of the meeting C. L. Brittain, of Gutta Percha & Rubber, Ltd., was elected chairman for the 1939-40 season, and L. D. Carver, of the Dunlop Tire & Rubber Goods Company, was elected secretary-treasurer. The following will constitute the Program Committee: J. C. Howard (Kaufman Rubber), T. Batty (Firestone), and T. D. Waring (Canada Wire & Cable).

Akron Group Officers

R. La Porte

H. V. Powers

Ralph La Porte, chief chemist of the Seiberling Rubber Co., and H. V. Powers, head of the compounding division of the Goodyear Tire & Rubber Co., were elected chairman and vice-chairman, respectively, at a meeting of the Akron Group, Rubber Division, A.C.S., held at the Mayflower Hotel in Akron on March 24, as reported in our previous issue.

Mr. La Porte, who had served a term as vice-chairman of the group prior to his elevation to the chairmanship, joined Seiberling Rubber as a laboratory assistant shortly after the company was founded in 1922, and gradually worked his way up to the position of chief chemist. A native Akronite, he matriculated at Ohio State University. He is a member of the A.C.S. and of the Brookside Country Club. Golf and shooting are his main hobbies.

Mr. Powers joined Goodyear as a tire finisher in 1916 and shortly thereafter became a member of the "Flying Squadron." He was given the task of organizing a similar squadron in Canada and when the Toronto factory was opened he joined it as head of the labor department as well as the squadron. He returned to the Akron factory in 1923 to take charge of the physical testing laboratory and later was transferred to research activities. For the past 8 years he has had charge of the compounding section which has to do with quality control of raw materials.

Akron Group Plans Outing

The Akron Group, Rubber Division, A.C.S., will hold its annual summer outing on June 16 at the Silver Lake Country Club. According to present plans, there will be a golf tournament in the afternoon with dinner and prize drawing in the evening. T. L. Stevens, of the C. P. Hall Company, Akron, is secretary-treasurer of the group.

N. Y. GROUP ISSUES PRIZE ESSAY RULES

At its meeting on March 17, 1939, the New York Group, Rubber Division, A.C.S., voted to sponsor a prize essay contest for members under 35 years of age. A committee of four has since been appointed to take full charge of the contest and to judge the papers. Members of the Committee are S. C. Stillwagon *(India Rubber World)*, chairman; A. H. Nellen (Lee Tire); E. R. Bridgwater (DuPont); and R. D. Gartrell (U. S. Rubber). Rules of the contest follow:

The subject matter should be of a technical nature relating to a property of rubber, compounding materials or practice, processing methods, technical equipment, or some such phase of rubber technology. In view of the fact that all rubber technicians may not have full opportunity to report original work or development results, the committee will give equal consideration to interpretive reviews of rubber literature relating to a particular phase of rubber technology.

From all papers submitted the committee will select at least one and not more than four papers, each of which is to be presented by the author at the first Fall meeting of the New York Group, and prize money totaling $100 will be distributed in the order of their value according to the best judgment of the committee, which will give consideration to clearness, conciseness, and informative value.

All rubber technicians, research workers and college students interested in the rubber industry are cordially invited to enter this contest. Paid up membership in the New York Rubber Group for 1939 is required of all entrants and any contestant not so qualifying must enclose $1.00 for a year's membership with the paper when submitted.

The closing date for receiving papers is September 1, 1939. In order to avoid identification of the author when the papers are judged, the author's initials should appear in the upper right-hand corner on each page of all copies, but the author's name and address should appear *only* on a separate piece of paper attached to the entry. All entries in quadruplicate, typewritten, and double spaced should be submitted to S. C. Stillwagon, *India Rubber World* 420 Lexington Ave., New York City.

Organize Martindell Co.

The Martindell Molding Co., Inc., headed by Milton H. Martindell, who was associated with the Jos. Stokes Rubber Company for more than 30 years, has been organized with a capitalization of $125,000. The new company, which will specialize in mechanical rubber goods, has already let a contract for a factory in Ewing Township, near Trenton, N. J. The factory will measure 50 x 125 feet and will cost approximately $20,000. Godfrey Zentmayer, formerly associated with Battle & Co., investment brokers, is vice-president of the new firm.

Names in the News

MIAH MARCUS, formerly treasurer and one of the founders of the Panther-Panco Rubber Co., Chelsea, Mass., was elected president of that company last month to succeed the late FRANK BERENSTEIN. MAURICE J. BERNSTEIN was named treasurer and will also retain active supervision of factory sales.

GEORGE L. DIRKS, manager, tire study department, B. F. Goodrich Co., Akron, was one of the feature speakers at the Conference of Industrial Relations held at the University of Michigan, Ann Arbor, Mich., on April 14. He spoke on labor productivity.

JOSEPH J. NORTON, associated with fabric mill activities of the Goodyear Tire & Rubber Company for many years, has become superintendent of the Cedartown, Georgia, mill, succeeding the late ROBERT H. STEWART.

CHARLES L. RICE, vice-president of the Western Electric Co., and manager of its Hawthorne Works at Chicago, was elected a member of the board of directors at the annual meeting of the company held in New York City on April 11.

KARL PECHMANN has resigned his position with the B. F. Goodrich Co., Akron, to become production chemist in the synthetic organic chemistry department of the Eastman Kodak Company at Rochester, N. Y.

WINSLOW A. PARKER, for many years credit manager of Southeastern Cottons, Inc., New York City, suppliers of cotton fabrics to the rubber and other industries, has been elected assistant treasurer of the company.

H. DONN KERESEY, president, Anaconda Wire & Cable Co., and A. L. VILES, president and general manager, Rubber Manufacturers Association, have been appointed members of the Industry Division of the Greater New York Fund.

EDWIN J. THOMAS, executive vice-president, Goodyear Tire & Rubber Co., celebrated his 40th birthday on April 27. He joined the company as a stenographer in 1916 shortly after being graduated from Akron's Central High School.

W. F. SEEGER was recently appointed general superintendent of operations of the United Carbon Company in the Borger, Texas, territory.

H. L. TRUMBULL, manager, research laboratories, B. F. Goodrich Co., Akron, discussed the so-called synthetic rubbers at a luncheon meeting of the Summit County Reserve Officers Corps held in Akron on April 17. He stressed their importance in the event of a general war.

MIAH MARCUS

GARTHWAITE ELECTED HEAD OF LEE TIRE

Albert A. Garthwaite, vice-president, treasurer and general manager of the Lee Rubber and Tire Corp., Conshohocken, Penna., was elected president of the company at a meeting of the board of directors held in New York City on April 12 to succeed the late John J. Watson. William B. Dunlap, assistant treasurer, was named to occupy Mr. Garthwaite's place as treasurer.

Mr. Garthwaite's elevation to the presidency culminates thirty years of service with Lee Tire. He left a position with the Mechanics & Metals National Bank of New York to join up with the late J. Elwood Lee, one of the founders of the company, to learn the business. He has occupied the triple post of vice-president, treasurer and general manager for the past 12 years.

The new president is a director of the First National Bank of Conshohocken, a member of the Chamber of Commerce of the State of New York and the Manufacturers Association of the United States, and a member of the Calvary Episcopal Church of Conshohocken. His clubs include the Racquet, Merion C. C., Philadelphia C. A., and the Seaview Golf. He has three daughters and one son.

Mr. Dunlap, the new treasurer, came to the Lee credit department 30 years ago next September and has held responsible positions in the fiscal division of the company ever since. Born in Philadelphia, he has resided in Conshohocken since he was a child, except for 8 years (1917-25) when the Lee offices were maintained in New York City. He has one son, associated with the company.

HEIL FACTION WINS CONTROL OF AETNA

Control of the Aetna Rubber Company, Cleveland, object of a bitter legal controversy since last December, was regained by the old management, at the annual meeting of the company held in Cleveland on April 21. The victorious faction, headed by Charles A. Heil, former chairman of the board, and Charles Mashek, former president, succeeded in electing three of the five directors by the narrow margin of 800 shares, representing the holdings of two stockholders.

The Heil faction elected T. M. Sourbeck, of the American Stove Co., E. W. Ferry, of the Ferry Screw Products Co., and Mr. Mashek as directors, while the opposing faction, headed by Stanley T. Campbell, which gained temporary control of the company last month as the result of a decision by the Ohio Supreme Court, elected A. J. Brandt and W. C. Young, both of the National Tool Co. Immediately after the election, the new directorate assembled and elected Mr. Mashek as president, Mr. Sourbeck as vice-president and Mr. Ferry as secretary-treasurer.

Prior to the holding of the meeting, the fight for control was again carried to the courts when Mr. Mashek asked Common Pleas Judge Lee E. Skeel for an injunction against the meeting on the grounds that Mr. Campbell, then president of the company, had named inspectors to tabulate the proxies who would be friendly to the Campbell group. The petition was dismissed however when a neutral attorney was named to inspect the count through intervention of the court.

New Plant for Albert

L. Albert & Son, dealers in new and used rubber machinery, of Trenton, N. J., and Akron, Ohio, are opening a new combination office, plant and warehouse in Los Angeles, Calif., at 800 East 62nd Street. The new branch will handle the company's Pacific Coast and Far East trade and will carry a complete line of rubber mill machinery and equipment. Machine shop facilities for rebuilding and overhauling all types of rubber machinery will also be maintained, with Frank Rebstock in charge of the department. Albert recently purchased the machinery and equipment of the rubber reclaiming plant operated at El Monte, Calif., by the R & H Chemical Division of E. I. du Pont de Nemours & Co., and has moved this equipment to its new warehouse in Los Angeles.

Producing Sponge Rubber

The Brown Rubber Co., of Lafayette, Indiana, has installed equipment for the manufacture of sponge rubber cushion seats, mattresses and furniture upholstery. The number of inquiries received on these materials is said to have led to the company's decision to manufacture them.

Obituaries

Arthur Hudson Marks

Arthur Hudson Marks, vice-chairman of the board of directors of the B. F. Goodrich Co., and formerly vice-president and general manager of the Diamond Rubber Co., died of a heart attack

at the age of 65 on May 1 while playing tennis at his Palm Beach, Florida, estate. At the time of his death he was also president of the Aeolian Skinner Organ Company of New York.

A native of New England, Mr. Marks entered Harvard University after being graduated from the Lynn (Mass.) Classical School. Although intending to become a physician he became so engrossed in chemistry that he left Harvard in his sophomore year to join the Boston Woven Hose & Rubber Company as assistant chemist. He remained with the company for two years, leaving in 1897 to become chief chemist of the old Revere Rubber Company, later absorbed by U. S. Rubber. Convinced that the process of reclaiming rubber could better be done with alkali than acid. Mr. Marks asked his superiors at Boston Woven Hose and later at Revere for money to purchase equipment and put his theories into practice, but according to report was turned down by both.

Shortly after he had joined Revere, officials of the Diamond Rubber Co., of Akron, which had been operating at a loss for some time, came to New England looking for new talent, and Mr. Marks seized the opportunity to go with that company as chief chemist. Within six months after joining Diamond, Mr. Marks was made vice-president and general manager. He had bought the equipment necessary to test his alkali theory, found it worked, patented the process, and sold it to Diamond in return for a block of stock.

Mr. Marks is also credited with a number of other "firsts" in the rubber industry. In 1902 he discovered there was rubber in the Mexican guayule shrub and for a number of years he shipped guayule rubber to Liverpool where it was processed and then reshipped to Akron. Competitors are said to have been at a loss to discover how Diamond was getting rubber suitable for certain purposes at half the cost of low-grade South American or African rubbers. In 1905 he secured a grant from the Diamond directors with which to establish a research laboratory in which he and George Oenslager conducted long and troublesome experiments the result of which was the discovery of organic accelerators. Mr. Marks is also believed to have introduced the cord tire into the United States.

Refused Goodrich Presidency

When Diamond was merged with Goodrich in 1912, Mr. Marks was asked to take over the presidency, but refused the offer preferring to retain the general managership. He was also named first vice-president. He resigned from the consolidated company in 1916, but at the directors' insistence remained as a consultant. He dropped this post too, however, one year later as he found his time fully occupied in technical work for the Navy during the war. He was commissioned as a lieutenant commander of the naval reserve. In 1930 Col. David Goodrich, chairman of the Goodrich directorate, induced Mr. Marks to take an interest in the rubber industry again and he joined the board, becoming vice-chairman two years ago.

Mr. Marks' major hobby was music, especially that of the organ. During the war he contributed considerably to keep the Skinner Organ Company alive and after the war he assumed the presidency of that company. He was also an art fancier, and his Fifth Avenue home in New York City had one entire floor devoted to an art gallery where paintings of the old masters intermingled with those of the better known painters of the current day.

Funeral services were held in New York on May 4 in the Church of the Incarnation, with interment in Woodlawn Cemetery. Honorary pallbearers included David Goodrich, S. B. Robertson, A. B. Newhall, and other Goodrich officials. He leaves a widow and a son.

Harold E. Joy

Harold E. Joy, associated with the B. F. Goodrich Company in Akron for twenty-five years prior to his retirement twenty years ago, died at his home in Akron on April 20 after a long illness. He was 72 years of age. Mr. Joy, who was born in England and came to Akron when about ten years old, served as general superintendent at Goodrich for many years. Funeral services were held at his home on April 22. Burial was in the East Akron Mausoleum.

Harry S. Vorhis

Harry Stephen Vorhis, one-time secretary of the Rubber Association of America, predecessor of the Rubber Manufacturers Association, and connected with Haire Publications, Inc., trade paper publishers of New York City, died on April 13 at Brooklyn Hospital, Brooklyn, N. Y., of pneumonia after a long illness. He was 65 years of age. Born in Spencer, N. Y., he was graduated from Yale in 1895 and entered the newspaper business, becoming city editor of the Waterbury (Conn.) Republican. He later served on several New York newspapers. At the time of the World War he was secretary of the Rubber Association, and in this capacity he cooperated with the British Government in regulating rubber shipments to this country. He left the Rubber Association in 1919 and joined Haire Publications in 1922. For the past 14 years he was also executive secretary of the National Notion Association. He leaves a widow and a daughter.

James D. Wilmot

James Deshler Wilmot, factory manager of the Providence, R. I., plant of the U. S. Rubber Co., died on April 24 in a Boston, Mass., hospital following a series of operations for a stomach ailment. Born in New Brunswick, N. J., in 1891, Mr. Wilmot was graduated from Rutgers University, and joined U. S. Rubber in 1911. At various times he was factory manager of the Malden, Mass., and Woonsocket, R. I., plants, both of which have since been discontinued. He was a grandson of James Deshler, one of the pioners of the domestic rubber industry. He leaves a widow and two sons.

James P. Krogh

James P. Krogh, treasurer of the old Hartford Rubber Works, died at his home in West Hartford, Conn., at the age of 70, on May 2 as the result of a throat infection. A native of Denmark, Mr. Krogh came to the United States at the age of 14, eventually became a teacher of business subjects, and in 1896 joined Hartford Rubber as treasurer. He held that post until 1929 when the plant, which had been taken over by U. S. Rubber in 1917, was moved to Detroit. Since 1929 he had served as custodian of the factory buildings which are now rented out to industrial firms. He leaves three sons and a daughter.

Albert V. W. Tallman

Albert V. W. Tallman, associated with the crude rubber business for the past 38 years in the capacity of broker and dealer, died at the age of 64 at his home in Westerleigh, Staten Island, N. Y., on April 26. He maintained offices at 110 Broad Street in New York City. In addition to his rubber work, Mr. Tallman was a director of the West New Brighton Bank of Staten Island. Funeral services were held at the Silvie Funeral Home in Port Richmond, S. I., on April 28. He leaves a widow.

Los Angeles News

The next supper meeting of the Los Angeles Group will be held at the Mayfair Hotel on Tuesday, June 6. In keeping with the group's policy of having some major manufacturer sponsor the program, the entertainment for this meeting will be in the hands of the Union Oil Company. The meeting will be the last of the current season.

While the date of the annual summer fishing excursion of the group has not been definitely set at this writing, the committee in charge of arrangements announces that the trip will be made into Catalina waters sometime in August. Most of the previous trips have been out of San Diego harbor, but Catalina Island has been selected this year in the hopes of securing a larger turnout of members and guests.

The third annual open house party of the Faulhaber Rubber Company was held at the company's plant on April 29. It was attended by over 100 friends and customers. After refreshments were served, the guests were shown the new press recently installed in the plant. This press, which measures 7½ x 17 feet, is believed to be the largest in use west of the Mississippi. According to Mr. Faulhaber, appreciable increases in sales and in the number of employees have been made in the past three years under the present management.

F. A. Steele has been appointed general superintendent of the Los Angeles plant of the Goodyear Tire & Rubber Co., replacing W. H. Fleming who was recently transferred to Akron to assume other duties. Mr. Steele started with the company in 1910 as a chemist, later served as foreman, general foreman and divisional superintendent at Akron, and was transferred to California in 1920. When the Goodyear plant at Gadsden, Alabama, was opened in 1928, Mr. Steele was made general superintendent of that plant, and in 1935 was transferred to a similar post at the Wolverhampton, England, plant, occupying that position until his latest transfer which brings him back to California.

The Kirkhill Rubber Company is now running 5 days a week with three 7-hour shifts a day in order to keep up with the increasing volume of business, according to T. Kirk Hill, president of the firm. Mr. Hill, together with Ed Royal of the H. M. Royal Company, recently spent two weeks on a fishing trip in Mexican waters. They were joined at Tucson by H. M. Royal, of Trenton, N. J.

Charles R. Warfel, resident partner of Bruhnke & Silver, collection firm of Los Angeles, who has been acting as assignee of the Waynway Rubber Company, recently announced that the Waynway estate was closed with the payment of a second and final dividend of 25.1% of claims. Although the original 50% settlement proposed by Mr. Warfel last December was not approved, he reports that final recovery of claims even under liquidation closely approximated that percentage.

Members of the "Old Guard" of the Akron factories of the Goodyear Tire & Rubber Company, consisting of employees who have been with the company for 40 years or more, recently paid a visit to the West Coast as guests of President P. W. Litchfield. Included in the tour was a visit to the Golden Gate Exposition at San Francisco, as well as stops at Los Angeles, San Diego, Muir Woods, the Grand Canyon and Litchfield Park.

Included in the party were Al Cunningham, for many years manager of the shipping room and now in charge of the main lobby of the Akron offices; Fred Colley, formerly foreman of crude rubber and now head of employee's activities; Clara Bingham, former assistant purchasing agent and now librarian; Edward F. Viers, former foreman, now inspector of truck tire building; George Swartz, chief rigger; and Ed Hippensteal, chief oiler. The party was met at Arizona by Mr. Litchfield.

The "Big Four" Tennis League, with Goodyear, Goodrich, U. S., and Firestone all competing, is playing a series of six matches spaced two weeks apart. Firestone and Goodyear courts are used alternately.

L. A. GROUP HOLDS "KIRKHILL NIGHT"

In keeping with the plan of having a large rubber company sponsor a program at each successive meeting, the monthly supper meeting of the Los Angeles Group, Rubber Division, A.C.S., held at the Mayfair Hotel in Los Angeles on May 2 was known as "Kirkhill Night." Approximately 110 members and guests attended the meeting.

T. Kirk Hill, president of the Kirkhill Rubber Company, was the principal speaker. After delivering a short address, Mr. Hill showed color movies of his factory depicting the various operations and processes. He also showed moving pictures taken in the West Indies and in South America on the occasion of a recent trip. At the conclusion of his presentation, Mr. Hill was presented with a brass gavel, a gift of the Scovill Manufacturing Co., by Garvin Drew, chairman of the group.

In addition to Mr. Hill's presentation, a short talk was made by Judge Le Roy Dawson, connected with the Los Angeles court of traffic violations, which was mainly concerned with the work of that court. A female magician invited by Mr. Hill then demonstrated some sleight-of-hand work.

The door prize for the evening, a toilet set and case, was won by W. A. Graham, while the special prize, a wallet and key case, went to Charles Churchill. These prizes, as well as special table favors consisting of rubber bath sprays, were donated by the Kirkhill Rubber Company.

Offer Replacement Tires

Ford tires, formerly available only as original factory equipment on the company's cars, are now being offered for replacement purposes, according to an announcement from Detroit.

New England News

Charles F. Robbins, president of A. G. Spalding & Bros. Co., Chicopee, Mass., reports a real basis for optimism in the steady growth of sports activities in America, with its inevitable effect in stimulating production of sporting goods. His own company, Mr. Robbins says, is looking forward to the remainder of 1939 "with a more hopeful spirit than has predominated in some past years".

As a means of solving unemployment problems, Col. Charles E. Speaks, president of the Fisk Rubber Co., Chicopee Falls, Mass., has urged that greater emphasis be placed on trade and vocational training in public schools. "America is overburdened with white collar workers", he declared. "The young men of today must understand that it should be an honor to work with one's hands."

Directors of the Acme Wire Co., New Haven, Conn., have voted a dividend of 20 cents a share, payable May 15 on stock of record May 10. Payment is being made on the basis of new $10-par stock. Previous payment on $20-par stock was 50 cents a share.

Connecticut Web & Buckle Co., Bridgeport, Conn., is building a one-story addition to its plant at 71 Knowlton Street. It will be 10 x 65 feet in size.

Raybestos Division of Raybestos-Manhattan, Inc., has moved its entire plant and offices from Bridgeport, Conn., to new quarters on East Main Street, Stratford, a Bridgeport suburb, where an existing branch plant has been greatly enlarged. An office building, laboratory and testing building, and a large garage have been erected in Stratford.

New Rubber Goods

Tail-Wheel Pneumatic Tire

Featuring an unusual design, a special tire for the tail wheels of plows has been developed by the B. F. Goodrich Co., Akron. Whereas the ordinary tire

has its tread directly in the center of the casing, the plow tail-wheel tire has its tread set at a sharp angle to the sidewalls. This design was found best for resistance to sidewall wear, both on the ground and while against the furrow wall. The new tire is protected against ground wear by a heavy angular tread, and against furrow wall chafing by a thick protecting rubber flange.

Goodyear Vibration Dampeners

Universal Vibration Dampeners for application to electrically-driven comptometers and various other accounting machines have been developed by the Mechanical Goods Division of the Goodyear Tire & Rubber Co., Akron, Ohio. Made of especially compounded rubber these vibrators, which are applied between the feet of the machines and the floor, are said to eliminate the vibration and at the same time reduce the mechanical noises of operation. Installation of the dampeners is also said to prolong the life of the machines.

Rubber-Covered Line

A rubber-covered clothes line which can be supplied in hanks or coils has been placed on the market by Samuel Mercer & Co., Albion House, 4 Queen Street Place, London, E.C. 4, England. It is strong and flexible and can be wiped clean with a damp cloth. The line can be quickly tied by a simple hitch which will not slip, according to the manufacturer, and the most delicate fabric will not be injured when hung on it. For strength, the line has a copper wire core.

Double-Action Eraser

By using closely matted eraser felt and sponge rubber, the Beckley-Cardy Co., 1632 Indiana Ave., Chicago, Ill., has developed a combination chalk eraser and blackboard cleaner which is said to outwear all ordinary blackboard erasers. The outside felts are

hinged to the back by continuous rows of double locked stitches so as to allow free action. The inner erasing felts and the center sponge rubber squeegee are also secured to the felt back in such manner to allow freedom of movement. As a result, when the new eraser is moved back and forth over the blackboard, each eraser felt removes the chalk marks while the sponge rubber center collects all the loose chalk dust. The rubber center not only assures clean blackboards, but it adds life to the eraser.

Seiberling Safety Tire

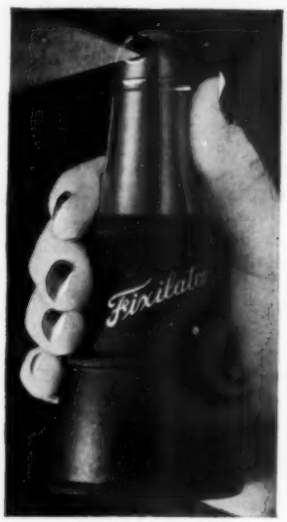
Incorporating three entirely new safety principles, according to the manufacturer, a new safety tire has been announced by the Seiberling Rubber Company, Akron, Ohio. The first new safety feature is a seven rib "saw-tooth" tread design, which grips the road from every angle when the brakes are applied; the second is the patented heat-venting principle, by which bullet-shaped vents pierce the shoulder areas of the tire and penetrate to the hottest part; and the third is a "heat-proofed" body of "Saf-Flex" cord, which is said to reduce tire "growth." The new tire is being manufactured in sizes from 5.50-16 to 7.50-16, in both black and white sidewalls.

Eddie Cantor Dolls

Eddie Cantor Dolls, made entirely of rubber, have been introduced by the firm of A. Ponnock, 527 Market Street, Philadelphia, Penna. The dolls, which are exact replicas of the famous radio and screen star, are approximately eight inches tall, are finished in non-injurious colors, and are said to be perfectly sanitary. All royalties derived by Mr. Cantor from the sales of these dolls are donated entirely to charity. The doll retails for 50 cents.

Fixilator Atomizer

One of the latest contributions to modern beauty shop equipment is a new atomizer for spraying the hair with tonics and oils. Called the



"Fixilator," it is described as being an "unbreakable lifetime atomizer" and although it has a metal container for liquids it is constructed chiefly of rubber. The device has no glass parts to break nor moving parts to go out of order. To fill the "Fixilator," a small rubber cap is removed and the liquid poured into the metal container.

Griptite Metal Cement

Griptite Metal Cement has been introduced by the St. Louis Rubber Cement Co., 3948 West Pine St., St. Louis, Mo. This cement will weld rubber to metal, anti-squeaks to metal, rubber to enameled metal, felt to metal, blue wadding to metal, cardboard to metal, cork to metal, and linoleum to metal or concrete, in addition to other uses and combinations. It comes to the customer all ready for use, and will withstand all climatic conditions.

Rubber Vacuum Coasters

A line of rubber vacuum coasters, which stick to glasses and prevent beverage drippings and stains to clothing and furniture, has been introduced by the Davis-Bell Co., 60 Park Place, Newark, N. J. The coasters are completely

of rubber and have a sponge rubber insert which fits around the center vacuum. These inserts come in a variety of colors so that hostesses may secure them in matching colors to home decorations. The vacuum section is of black rubber.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, MAY 9, 1939

Crude Rubber

CRUDE rubber prices have swung in a narrow range since our last report, high for the period being 16.05 on May 9 and low 15.63 on April 24. Heavy commission house liquidation, attributed to the uncertain European situation, kept the price for spot down in mid-April, but it improved somewhat after the Rubber Manufacturers Association issued consumption figures for March, the figure of 50,165 being considerably higher than trade anticipations. Future quotations were generally better than spot prices throughout the period, primarily due to foreign dealer buying. Renewal of commission house buying, combined with some factory interest, brought the price up to the 16-cent level on May 3. Lack of sustained interest, however, dropped it below that level in the next several trading sessions, but the release of lower stock figures in the Far East plus the issuance of official figures on 1938 supplies and consumption by the Department of Commerce brought the price up to 16.05 today (May 9). Quotations in the outside market, Exchange, London and Singapore, follow:

As of May 9

Plantations—

Ribbed Smoked Sheets—

No. 1 Spot	—	@	.16 1/16
July-September	—	@	.16¼
October-December	—	@	.16 1/16
No. 2	—	@	.16
No. 3	—	@	.15 15/16
No. 4	—	@	.15⅞
Thin Latex Crepe	—	@	.17¾
Thick Latex Crepe	—	@	.18¼
Brown Crepe, No. 1	—	@	.15⅞
Brown Crepe, No. 2	—	@	.15¾
Amber Crepe, No. 2	—	@	.15⅞
Amber Crepe, No. 3	—	@	.15¾
Brown Crepe, Rolled	—	@	.14 7/16

Latex—

Normal, per lb., carload lots	—	@	.19¼

Paras—

Up-River, fine	—	@	.14
Acre Bolivian, fine	—	@	.14¼

Balata—

Surinam sheet	—	@	.38

LONDON MARKET

Standard Smoked Sheets—Buyers—May 9

July-September	8 1/16	@	8 1/16d
October-December	8 1/16	@	8¼d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—May 9

July-September	—	@	7 13/16d
October-December	—	@	7 15/16d

Reclaimed Rubber

Although business was fair in late April it dropped off somewhat early in May. Reclaimers attribute the reduced demand to the falling off in automobile production as well as curtailed activity in the insulated wire field. An early pick-up, however, is anticipated. There has been no change in the price structure since our last report. Current quotations follow:

Shoe

Unwashed	lb.	.06½	@	.06¾
Washed	lb.	.10	@	.10¼

Tube

No. 1 (Floating)	lb.	.12	@	.12¼
No. 2 (Compounded)	lb.	.08	@	.08¼
Red tube	lb.	.08	@	.08¼

Tires

Black (acid process)	lb.	.07	@	.07¼
Black, selected tires	lb.	.06	@	.06¼
Dark Gray	lb.	.09¼	@	.09¾
White	lb.	.11½	@	.12
Truck, Heavy Gravity	lb.	.05½	@	.06
Truck, Light Gravity	lb.	.07	@	.07½

Miscellaneous

Mechanical blends	lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

Business has been very quiet in the past few weeks and dealers are preparing for the usual and anticipated summer slump. The price on beadless tire scrap has dropped slightly since our last report. The stock situation is said to be fair. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	17.50	@	18.50
Mixed auto	ton	12.00	@	13.00
Beadless tires	ton	14.50	@	15.50
Clean solid truck tires	ton	23.00	@	25.00
Boots and shoes	ton	17.50	@	19.00
Arctics, untrimmed	ton	13.00	@	15.00
Inner tubes, No. 1	lb.	.07	@	.08
Inner tubes, No. 2	lb.	.03⅞	@	.04
Inner tubes, Red	lb.	.03⅝	@	.03¾

Cotton

After exhibiting a declining tendency in mid-April, primarily due to heavy liquidation on long lines, the price for middling uplands on the Cotton Exchange started an upward movement which has been checked occasionally because of uncertainty as to the Government's decision on some method of alleviating the stock situation. Steady mill calling and trade price fixing featured trading sessions in the closing weeks of April. Despite trade confusion on reports from Washington relative to the possibility of some form of export subsidy on cotton, the price continued its upward movement in May, encouraged by strengthening of the Liverpool market and mill covering. Cotton prices soared into new high ground for the current season today (May 9), middling uplands reaching a figure of 9.58, based on foreign buying induced by Senate actions at Washington, trade calling, and evidences of the first Wall Street speculative demand in many months. Low for the period was 8.63 on April 12. Quotations on the Exchange follow:

	Apr. 10	May 9		
	Close	High	Low	Close
July	7.80	8.56	8.41	8.55
October	7.50	7.98	7.82	7.98
December	7.45	7.81	7.65	7.81

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.27½	@ —
Peeler, carded, 23/4/3	lb.	.28½	@ —
Peeler, carded, 15/3/3	lb.	.25½	@ —
Peeler, carded, 13/3/3	lb.	.24½	@ —
Egyptian, carded, 23/5/3	lb.	.39¾	@ —
Egyptian, combed, 23/5/3	lb.	.44¾	@ —

CHAFERS

Carded, American, 1 1/16"	lb.	.27¼	@ .27½
Carded, American, 1"	lb.	.18	@ .24

Sheetings

48x40	36 in.	5.50	lb.	— @	.03⅝
40x40	36 in.	6.15	lb.	— @	.03¼
40x36	36 in.	6.50	lb.	— @	.03⅛
48x48	40 in.	2.50	lb.	— @	.07
48x48	40 in.	2.85	lb.	— @	.06
56x60	40 in.	3.60	lb.	— @	.05½
48x44	40 in.	3.75	lb.	— @	.05
44x40	40 in.	4.25	lb.	— @	.04¼

Ducks

Enameling (single filling)	lb.	.21	@	.23
Belting and Hose	lb.	.25¼	@	—
Single filling, A grade	lb.	.09¼	@	.12¼
Double filling	lb.	.10¼	@	.13¼

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM APRIL 11 TO MAY 9

Date	Spot	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Sales
Apr. 11	15.80	15.80	15.80	15.81	15.83	15.83	15.83	15.81	15.83	15.85	15.85	15.85	15.85	——	317
12	15.73	15.73	15.73	15.75	15.76	15.76	15.76	15.76	15.78	15.79	15.79	15.79		——	327
13	15.83	15.82	15.82	15.83	15.84	15.84	15.85	15.85	15.85	15.86	15.87	15.87	15.87	——	126
14	15.65	15.65	15.65	15.66	15.67	15.67	15.68	15.68	15.68	15.66	15.68	15.68	15.68	——	318
15	15.75	15.75	15.75	15.75	15.76	15.76	15.76	15.77	15.77	15.76	15.77	15.77	15.77	——	77
16															
17	15.65	15.65	15.65	15.66	15.67	15.67	15.67	15.68	15.68	15.68	15.68	15.68	15.68	——	78
18	15.75	15.72	15.72	15.73	15.75	15.76	15.78	15.78	15.78	15.79	15.80	15.81	15.81	——	141
19	15.95	15.90	15.90	15.93	15.96	15.95	15.95	15.96	15.96	15.97	15.97	15.97	15.97	——	205
20	15.85	15.83	15.83	15.85	15.88	15.88	15.88	15.88	15.89	15.90	15.91	15.92	15.94	——	246
21	15.82	15.79	15.79	15.83	15.87	15.89	15.91	15.90	15.90	15.89	15.90	15.92	15.94	——	81
22	15.75	15.72	15.72	15.77	15.83	15.83	15.84	15.85	15.86	15.87	15.89	15.91	15.95	——	103
23															
24	15.63	15.60	15.60	15.65	15.70	15.72	15.74	15.75	15.76	15.77	15.79	15.82	15.85	——	158
25	15.75	15.70	15.70	15.76	15.82	15.85	15.89	15.90	15.91	15.92	15.95	15.95	15.95	——	212
26	15.80	——	15.76	15.81	15.86	15.87	15.89	15.91	15.93	15.95	15.97	15.97	15.98	——	314
27	15.80	——	15.76	15.80	15.85	15.88	15.91	15.93	15.95	15.97	15.98	15.99	16.00	——	260
28	15.88	——	15.82	15.86	15.90	15.92	15.95	15.98	16.01	16.02	16.05	16.07	16.09	——	171
29	15.82	——	15.75	15.80	15.85	15.86	15.87	15.89	15.91	15.94	15.93	15.93	15.93	——	30
30															
May 1	15.75	——	15.69	15.74	15.80	15.81	15.83	15.84	15.85	15.86	15.87	15.87	15.88	15.88	126
2	15.85	——	15.80	15.86	15.93	15.95	15.98	15.98	15.98	15.98	15.98	15.98	16.00	16.00	64
3	16.00	——	15.95	16.01	16.07	16.08	16.10	16.10	16.10	16.10	16.13	16.14	16.15	16.15	175
4	15.90	——	15.87	15.91	15.95	15.97	16.00	16.00	16.00	16.00	16.01	16.02	16.04	16.04	56
5	15.98	——	15.93	15.98	16.04	16.04	16.04	16.04	16.05	16.06	16.07	16.08	16.10	16.10	71
6	15.90	——	15.85	15.91	15.98	15.98	15.98	15.98	15.99	16.00	16.01	16.01	16.02	16.02	21
7															
8	15.95	——	15.86	15.90	15.95	15.95	15.96	15.96	15.96	15.96	16.00	16.00	16.00	16.00	18
9	16.05	——	15.98	16.03	16.08	16.09	16.11	16.12	16.12	16.12	16.13	16.14	16.14	16.14	104

New York
May 11, 1939

Rubber CHEMICAL Markets

All Quotations F.O.B. Works Unless Noted

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.24 @	—
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.70 @	.80
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.55 @	.70
Butyl Zimate	lb.	3.00 @	—
Captax	lb.	.50 @	.60
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.45
El-Sixty	lb.	.50 @	.65
Ethyl Zimate	lb.	3.00 @	—
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.37½ @	.42
Guantal	lb.	.40 @	.50
Heptene	lb.	.35 @	.40
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.14 @	—
Witco		.15 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	— @	2.65
Oxynone	lb.	.64 @	.80
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.55 @	1.85
R & H 40	lb.	.40 @	.41
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	2.50 @	2.75
R-23	lb.	.40 @	—
RN-2	lb.	1.40 @	1.80
RN-2 Crystals	lb.	2.00 @	2.25
Rotax	lb.	.60 @	.65
Safex	lb.	1.25 @	1.30
SPDX	lb.	.70 @	.75
Super-Sulphur No. 1	lb.	.50 @	—
No. 2	lb.	.18 @	.20
Thiocarbanilid, drums	lb.	.24 @	.30
Trimene	lb.	.55 @	.65
base	lb.	1.05 @	1.20
Triphenylguanidine	lb.	.45 @	—
Tuads	lb.	2.65 @	—
Ulto	lb.	1.50 @	1.75
Ureka	lb.	.60 @	.75
Ureka Blend B	lb.	.60 @	.75
Ureka C	lb.	.56 @	.65
Vulcanex	lb.	.42 @	.43
Vulcone	lb.		
Vulcanol	lb.	.85 @	—
Zimate	lb.	2.65 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)

Blues			
Prussian	lb.	.36 @	.37
Ultramarine	lb.	.15 @	—
Browns			
Mapico	lb.	.13 @	—
Umber, Turkey	lb	.04 @	.04½
Greens			
Chrome	lb.	.21 @	—
Chromium Oxide, bbl.	lb.	.21 @	—
Guignet's Green	lb.	.?0 @	—
Reds			
Antimony crimson, 15/17	lb.	.45 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone, No. 19	lb.	.05⅝ @	.06⅛
Cryptone CB, No. 21	lb.	.05⅝ @	.06⅛
Cryptone, ZS-20	lb.	.08⅛ @	.08⅝
Cryptone, ZS-86	lb.	.08⅜ @	.08⅝
Lithopone			
Albalith, black label—11	lb.	.04⅛ @	.04⅜
Azolith	lb.	.04⅜ @	.04⅝
Ray-bar	lb.	.05⅞ @	.06⅜
Ray-cal	lb.	.05⅞ @	.06⅜
Rayox	lb.	.16 @	.19
Titanox A	lb.	.14 @	.17
Titanox B	lb.	.05⅝ @	.06⅝
Titanox C	lb.	.05⅝ @	.06⅝
Zinc Oxide—American Process			
American Azo: ZZZ (lead free)	lb.	.06¼ @	.06½
Anaconda, lead free	lb.	.06¼ @	.06½
Horsehead Lead Free Brand:			
Special—3	lb.	.06¼ @	.06½
XX Red—4	lb.	.06¼ @	.06½
XX Red—72	lb.	.06¼ @	.06½
XX Red—78	lb.	.06¼ @	.06½
XX Red—103	lb.	.06¼ @	.06½
Kadox, black label—15	lb.	.06½ @	.06¾
Blue label—16	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06¼ @	.06½
green label	lb.	.06¼ @	.06½
red label	lb.	.06¼ @	.06½
U. S. P—7, bbls.	lb.	.09½ @	.09¾
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.08¼ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Cadmolith	lb.	.45 @	.50
Chrome	lb.	.14½ @	.15½
Mapico	lb.	.09½ @	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0275 @	.0625
Bone, powdered	lb.	.05½ @	.14
Carbon, compressed	lb.	.0275 @	.0625
uncompressed	lb.	.0275 @	.0625
"Certified"	lb.	— @	—
"Spherons"	lb.	— @	—
"Disperso"	lb.	.0275 @	.0625
"Excello," compressed	lb.	.0275 @	.0625
"Fumonex"	lb.	.03 @	.05
"Gastex"	lb.	.03 @	.05
Lampblack	lb.	.07 @	.12
"Micronex"	lb.	.0275 @	.0625
"Supreme"	lb.	.0275 @	.0625
Thermatomic—"P 33"	lb.	.04¾ @	.07¾
"Thermax"	lb.	.01¾ @	.05
United "Dixie" & "Kosmos"	lb.	.0275 @	.0625

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00 @	15.00
Barium carbonate (98-100%)	ton.	— @	—
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65 @	31.15
Basofor	lb.	.04½ @	—
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	60.00 @	65.00
Calcene	ton	37.50 @	45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40 @	60.00
heavy	ton	45.00 @	55.00
Clay, Kaolin, domestic	ton	7.50 @	15.00
Aerfloted, Suprex	ton	9.50 @	21.00
Congaree	ton	9.50 @	—
Crown (f.o.b. plant)	ton	9.50 @	—
Dixie	ton	11.00 @	30.00
Dixie, Jr.	ton	9.50 @	29.00
McNamee	ton	9.50 @	22.00
Par	ton	9.50 @	22.00
Witco	ton	9.50 @	—
Cotton Flock (Dark)	lb.	.10 @	.13
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	19
Kalite No. 1	ton	24.00 @	50.00
Kalite No. 3	ton	34.00 @	60.00
"Lime Crest" Industrial Filler No. 100	lb.	— @	—
Magnesium carbonate	lb.	.07½ @	—
Mica	ton	35.00 @	44.00
Pyrax A	ton	7.50 @	20.00
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00 @	22.00
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	17.00 @	20.00
Whiting, commercial	ton	17.00 @	18.00
Columbia Filler	ton	9.00 @	14.00
English Cliffstone	ton	33.00 @	43.00
Witco	ton	6.00 @	—
Wood Flour	ton	20.00 @	25.00
Zinc Carbonate	lb.	— @	.10¾
Zinc Stearate	lb.	.23 @	—

MINERAL RUBBER

285°-300° Mineral Rubber	ton	22.00 @	42.00
Black Diamond	ton	27.00 @	—
Genasco, solid (factory)	ton	25.00 @	27.00
Hard Hydrocarbon	ton	22.00 @	42.00
Parmr, solid	ton	25.00 @	—
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50 @	4.00
Rodo #10	lb.	4.50 @	5.00
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors No. 5145	lb.	2.00 @	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.50
Santomerse (dispensing, wetting, penetrating and stabilizing agent)	lb.	.11 @	—
Sunproof	lb.	.23 @	.25
Sponge Paste	lb.	— @	.18
Tackol (tackifier)	lb.	.115 @	—
Tonox	lb.	.52 @	.61

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.53 @	2.78
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.12 @	.14
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.08 @	.09
Stearic, double pressed	lb.	.12½ @	.13½
Stearite	lb.	.10½ @	.11¼
Alkalies			
Caustic Soda, 76%	cwt.	2.70 @	3.55
Soda Ash, 58%, C.L.	cwt.	— @	2.35
Oils			
Cycline Oil	gal.	.14 @	.20
Degras, bbls.	lb.	.07¾ @	.08
Fluxrite	lb.	.05½ @	.06½
Palm Niger	lb.	.05½ @	.06¾
Para-Flux	gal.	.17 @	.18
Para Lube	lb.	— @	.05
Petrolatum, light	lb.	.03½ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.64 @	.69
Rosin Oil, cmpd	gal.	.40 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rubtack	lb.	.08 @	.10
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07 @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05½ @	.06½
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	6.00 @	6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	ton	20.00 @	26.00
Solvents			
Acetone, pure	lb.	— @	.06¾
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.50
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon tetrachloride	lb.	.05½ @	.08
Dichlorethylene	lb.	— @	.25
Dipentene, cml., drums	gal	.41 @	.50
Ethylene dichloride	lb.	.05½ @	.06½
Plastogen	lb.	.07¾ @	.12½
Reogen (drums)	lb.	.11½ @	.20
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	— @	.09½
Turpentine, spirits	gal.	.43 @	.47
dest. dist., drums	gal.	.33 @	.41
Waxes			
Beeswax, white	lb.	.39 @	.45
Carnauba, yellow	lb.	.46 @	.47½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¼
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02¼ @	—
White crude scale 124/126	lb.	.02¾ @	.03
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50 @	2.10
Exel	lb.	1.00 @	1.40
Gel	lb.	.57 @	.77
Hipar	lb.	.65 @	.92
Powder	lb.	.52 @	.73
Resin	lb.	.52 @	.73
Resin D	lb.	.52 @	.73
White	lb.	1.25 @	1.75
Albasan	lb.	.70 @	.75
Antox	lb.	.56 @	.58
B-L-E	lb.	.52 @	.61
Flectol B	lb.	.52 @	.65
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone	lb.	.52 @	.63
Oxynone	lb.	.65 @	—
Retardex	lb.	.35 @	.40
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stanilite Alba	lb.	.70 @	.75
VGB	lb.	.52 @	.61

MOLD LUBRICANTS

Aresklene	lb.	— @	—
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.25 @	.30
Mold Paste	lb.	.12 @	.18
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rusco, f.o.b. Nitro	lb.	.12 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.19 @	—
Black	lb.	.07 @	.11
White	lb.	.08 @	.12
Brown	lb.	.07 @	.11
Neophax	lb.	.10¼ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½ @	.15
Sulfur Chloride, yellow (drs.)	lb.	.04 @	—
Sulfur flour, Refined, 100% pure (bags)	cwt.	2.50 @	3.65
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.91	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1938	397,620	125,357,730	14.07	5,652	1,799,124	14.21	391,968
1938:							
Mar.	41,592	13,494,654	14.48	646	198,865	13.74	40,946
Apr.	31,042	9,495,476	13.66	250	75,797	13.55	30,792
May	27,229	8,010,250	13.13	528	167,831	14.20	26,701
June	25,983	7,150,115	12.29	399	116,458	13.03	25,584
July	21,771	5,723,381	11.74	420	127,522	13.54	21,351
Aug.	30,798	8,477,231	12.29	432	133,350	13.79	30,366
Sept.	34,383	10,650,107	13.83	803	242,324	13.48	33,580
Oct.	33,449	10,945,896	14.61	621	196,523	14.14	32,828
Nov.	31,903	10,572,345	14.79	415	146,276	15.73	31,488
Dec.	36,031	12,601,926	15.61	424	141,364	14.87	35,607
1939							
Jan.	35,255	12,313,006	15.59	468	165,663	15.79	34,787
Feb.	29,109	10,269,224	15.75	460	152,113	14.76	28,649
Mar.	43,490	15,058,279	15.46	439	171,279	17.43	43,051

* Revised.

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,533	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1938	2,485	623,819	509	181,140	9,132	2,944,504	11,878	4,147,318
1938:								
Mar.	150	41,518	69	19,454	587	239,271	979	327,844
Apr.	188	50,423	66	25,741	1,265	444,756	889	295,690
May	229	61,756	29	8,806	900	274,652	879	279,502
June	150	41,518	34	11,496	918	276,126	695	214,420
July	223	49,099	51	16,130	869	267,491	634	209,526
Aug.	250	53,285	41	13,637	526	159,784	876	308,573
Sept.	173	37,954	39	13,896	740	225,161	683	235,242
Oct.	126	27,692	45	20,641	614	163,635	876	347,348
Nov.	59	12,923	66	24,725	307	76,452	1,020	394,082
Dec.	181	39,869	13	6,263	917	237,653	1,263	479,966
1939:								
Jan.	226	49,580	61	20,417	843	203,753	1,602	599,927
Feb.	212	46,576	15	4,426	510	129,726	1,717	657,565
Mar.	229	39,520	14	5,215	641	136,112	2,005	731,302

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1932*	1933*	1934*	1935*	1936*	1937*	1938	1939
Jan.	29,648	22,645	39,190	46,636	48,631	50,879	29,429	46,234
Feb.	31,821	21,392	40,515	42,720	36,841	51,950	23,868	42,365
Mar.	29,505	17,843	47,003	42,153	42,813	54,129	30,487	50,165
Apr.	27,518	25,928	44,853	44,247	52,031	51,859	27,984	
May	30,957	44,074	42,918	41,101	50,612	51,795	28,947	
June	41,475	50,743	40,147	36,156	52,772	51,860	30,629	
July	29,976	49,614	32,553	35,917	48,250	43,703	32,209	
Aug.	23,721	44,428	33,216	38,775	46,777	41,506	38,170	
Sept.	23,847	35,281	30,258	37,086	46,449	43,945	37,823	
Oct.	22,286	31,543	31,253	41,969	49,637	38,754	40,333	
Nov.	23,231	28,831	34,748	42,310	50,433	34,025	46,169*	
Dec.	18,015	28,757	36,569	42,474	49,754	29,195	45,315	
Tot.	332,000	401,079	453,223	491,544	575,000	543,600	411,363	

* Revised.

Note: Figures for 1931-1937 were revised in May, 1938, and are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks[a]	Year	Production	Consumption Tons	Consumption % to Crude	Stocks[a]
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	113,078	23.0	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	141,486	24.6	19,000
1932	75,608	77,504	23.4	16,354	1937*	185,033	162,000	29.8	28,800
1933	99,560	81,602	19.9	20,746	1938	113,482	113,341	27.6	21,769

Figures on Monthly Basis

1938:									
Jan.*	7,698	6,940	23.6	28,900	July	7,109	8,273	25.7	18,832
Feb.*	6,198	7,141	29.9	27,487	Aug.	10,472	10,732	28.1	17,892
Mar.*	6,875	8,471	27.8	25,432	Sept.	12,016	11,281	29.8	18,127
Apr.	6,399	7,480	26.7	23,339	Oct.	13,558	11,803	29.3	19,090
May	6,866	8,009	27.7	22,275	Nov.	13,995	12,668	27.5	19,823
June	7,584	8,274	27.0	21,040	Dec.	14,712	12,269	27.1	21,769
1939:									
Jan.	13,763	13,000	28.1	21,960	July	.....	.....	...	.....
Feb.	13,093	12,626	29.8	21,390	Aug.	.....	.....	...	.....
Mar.	14,528	15,322	30.5	19,955	Sept.	.....	.....	...	.....
Apr.	.....	.....	...	.....	Oct.	.....	.....	...	.....
May	.....	.....	...	.....	Nov.	.....	.....	...	.....
June	.....	.....	...	.....	Dec.	.....	.....	...	.....

[a] Stocks on hand at the end of month or year.

* Revised.

Note: Figures for 1936 were revised on June 1, 1937, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1937*	1938	1939		1937*	1938	1939
January	33,668	35,176	37,847	August	49,598	50,459	.....
February	32,034	31,861	34,595	September	47,515	46,058	.....
March	40,524	41,259	.....	October	45,446	46,272	.....
April	43,461	43,254	.....	November	42,718	44,991	.....
May	45,407	44,911	.....	December	39,465	41,649	.....
June	48,447	48,293	.....				
July	51,069	47,474	.....	Total	519,352	521,657	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,257,964
1930	17,364,096	1934	12,255,118	1938	10,612,138

1939		1939		1939	
January ...	1,714,137	May	.....	September .	.....
February ..	1,442,535	June	.....	October ...	.....
March	1,730,211	July	.....	November .	.....
April	.....	August	.....	December .	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1937																																
Jan.	21	21	21	20	20	21	21	21	22	22	22	22	23	21	21	21	21	21	20	21	20	20	20	21	21	21	21	21	21	21	—	21
Feb.	21	21	21	21	21	21	21	21	21	21	23	23	23	22	23	23	23	25	20	20	20	23	23	24	25	25	21	21	21	21	21	21
Mar.	21	21	21	21	22	22	22	22	22	24	23	23	23	24	23	23	23	25	24	24	24	24	24	25	25	25	25	25	26	26	26	24
April	26	26	26	21	25	24	24	24	24	24	23	23	23	22	22	22	22	22	22	22	23	23	23	23	23	23	22	20	20	21	21	23
May	21	21	21	21	21	21	21	22	24	24	23	23	23	22	22	22	22	22	22	22	21	21	21	21	21	21	21	20	20	20	20	21
June	20	20	21	19	19	19	19	19	18	18	18	18	18	18	18	18	18	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
July	19	19	19	18	18	18	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	18	18	18	18	18	19
Aug.	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Sept.	18	18	18	17	17	17	18	19	19	19	18	18	18	16	16	16	16	16	16	16	16	16	16	16	16	16	16	15	15	15	15	16
Oct.	17	17	17	16	16	16	16	16	16	16	16	16	16	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Nov.	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Dec.	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
1938																																
Jan.	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Feb.	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Mar.	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½
April	10⅞	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½	14½
May	11¾	11¾	11½	11½	11½	11½	11½	11½	11¾	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
June	11¾	11¾	11¾	11½	11½	11½	11½	11¾	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
July	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼	13¼
August	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
Sept.	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
Oct.	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼
Nov.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
1939																																
Jan.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Feb.	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝
March	16⅛	16⅛	16⅜	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
April	15⅞	15⅞	16	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
May	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Markets)

Average Price per Pound for Years 1911-1931

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	**22.48**
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	**20.55**
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	**11.98**
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	**6.17**

Average Monthly Price per Pound Since 1932

	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	4.38	3.08	9.32	13.10	14.35	21.37	14.63	15.75
Feb.	4.03	2.95	10.45	12.92	15.48	21.33	14.71	15.93
Mar.	3.35	3.01	11.01	11.51	15.89	24.09	13.55	16.26
Apr.	3.02	3.56	12.10	11.55	15.98	23.44	11.84	15.87
May	3.09	4.95	13.26	12.05	15.62	21.14	11.57	
June	2.66	6.15	13.51	12.57	15.85	19.29	12.57	
July	2.89	8.01	14.60	12.10	16.49	18.86	15.37	
Aug.	3.63	7.31	15.47	11.98	16.25	18.37	16.08	
Sept.	3.84	7.30	15.36	11.55	16.46	18.55	16.15	
Oct.	3.65	7.64	13.96	12.62	16.55	16.28	16.89	
Nov.	3.44	8.66	13.04	13.15	17.97	14.60	16.24	
Dec.	3.24	8.87	12.98	13.28	20.01	15.41	16.05	
Average for Year	3.49	5.96	12.92	12.37	16.41	19.39	14.64	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1939 Feb.	1939 Mar.	1939 Apr.	1939 May	Day	1939 Feb.	1939 Mar.	1939 Apr.	1939 May
1	7 13/16	8¼	7 11/16	7 7/8	17	8 1/16	8 1/16	7 7/8	
2	7 3/4	8 1/16	—	7 7/8	18	8 1/16	7 7/8	—	
3	7 13/16	8¼	8	7 13/16	19	—	—	7 7/8	
4	7 13/16	8 1/16	7 7/8	7 13/16	20	8 1/16	7 15/16	7 13/16	
5	—	—	7 13/16	7 13/16	21	8 1/16	7 15/16	7 7/8	
6	7 7/8	8 1/16	7 13/16	7 13/16	22	8 1/8	7 7/8	7 13/16	
7	7 13/16	8 3/8	—	—	23	8 1/16	8	—	
8	7 13/16	8 1/16	—	7 13/16	24	8 1/16	8	7 7/8	
9	7 13/16	8 1/16	—	7 13/16	25	8 1/16	7 13/16	7 7/8	
10	7 5/8	8 1/16	—		26	—	—	7 13/16	
11	7 13/16	8 1/16	7 7/8		27	8¼	8 1/16	7 7/8	
12	—	—	7 13/16		28	8¼	7 15/16	7 13/16	
13	7¾	8¼	7 13/16		29	—	8	7 13/16	
14	7 13/16	8 1/16	7 13/16		30	—	8	—	
15	8	8 1/16	—		31	—	8	—	
16	7 13/16	8 1/16	—						

Average Monthly Price Per Pound

Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence	Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence
Jan.	6.758	10.378	7.077	7.926	Aug.	7.581	8.830	7.841	
Feb.	7.255	10.503	7.029	**7.942**	Sept.	7.577	8.935	7.918	
Mar.	7.450	11.766	6.590	**8.120**	Oct.	7.898	7.855	8.355	
Apr.	7.502	11.471	5.793	7.910	Nov.	8.572	7.080	8.111	
May	7.335	10.250	5.632		Dec.	9.580	7.332	8.005	
June	7.352	9.548	6.147		Average for Year	7.713	9.424	7.164	
July	7.696	9.136	7.464						

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1939 Mar.	1939 Apr.	1939 May	Date	1939 Mar.	1939 Apr.	1939 May	Date	1939 Mar.	1939 Apr.	1939 May
1	9.05	8.81	9.24	11	9.11	8.74		22	8.92	8.83	
2	9.05	—	9.17	12	—	8.63		23	8.94	—	
3	9.08	8.87	9.24	13	9.14	8.66		24	8.90	8.99	
4	9.12	8.75	9.26	14	9.09	8.69		25	8.92	8.94	
5	—	8.79	9.31	15	9.08	8.69		26	—	9.09	
6	9.17	8.73	9.36	16	8.98	—		27	8.92	9.11	
7	9.13	—	—	17	9.02	8.84		28	8.90	9.20	
8	9.02	—	9.40	18	8.89	8.93		29	8.83	9.12	
9	9.10	—	9.58	19	—	8.98		30	8.80	—	
10	9.15	8.74		20	9.00	8.97		31	8.83	—	
				21	8.96	8.87					

Average Monthly Price Per Pound

	1936 Cents	1937 Cents	1938 Cents	1939 Cents		1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	11.91	13.06	8.57	8.94	Aug.	12.28	10.41	8.41	
Feb.	11.53	13.15	8.91	**8.97**	Sept.	12.31	9.02	8.17	
Mar.	11.43	14.46	8.92	9.00	Oct.	12.30	8.42	8.61	
Apr.	11.71	14.23	8.76	8.87	Nov.	12.23	7.96	9.08	
May	11.68	13.34	8.50		Dec.	12.83	8.26	8.72	
June	12.02	12.70	8.38		Average for Year	12.11	11.44	8.66	
July	13.11	12.26	8.85						

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of	ON HAND 1937	ON HAND 1938	ON HAND 1939	AFLOAT 1937	AFLOAT 1938	AFLOAT 1939	ON HAND AND AFLOAT 1937	ON HAND AND AFLOAT 1938	ON HAND AND AFLOAT 1939
Jan.	204,436	274,581	237,826	55,096	57,356	48,210	259,532	331,937	286,036
Feb.	195,692	294,338	231,475	53,538	47,459	55,814	249,230	341,797	287,289
Mar.	192,980	299,172	219,843	56,994	41,882	55,981	249,974	341,054	275,824
Apr.	176,289	301,436		72,530	39,071		248,819	340,507	
May	175,273	299,720		58,542	32,859		233,815	332,579	
June	172,056	294,566		57,215	32,079		229,271	326,645	
July	167,094	284,914		75,779	40,400		242,873	325,314	
Aug.	174,195	277,463		80,439	47,772		254,634	325,235	
Sept.	186,193	276,586		83,288	48,927		269,481	325,513	
Oct.	200,025	269,937		80,653	51,062		280,678	320,999	
Nov.	222,707	254,196*		81,302	51,114		304,009	305,310*	
Dec.	262,204	245,413		63,099	45,105		325,303	290,518	

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1937	London 1938	London 1939	Liverpool 1937	Liverpool 1938	Liverpool 1939
January	29,005	40,203	51,420	41,895	21,711	28,789
February	26,508	46,596	48,312	37,078	24,737	26,784
March	21,292	50,233	46,768	30,622	26,220	24,996
April	21,128	54,296		27,443	28,277	
May	21,351	57,194		25,081	29,862	
June	21,964	60,307		21,258	31,837	
July	22,589	62,236		19,424	32,825	
August	25,211	65,113		19,817	34,315	
September	28,462	63,321		21,190	34,645	
October	30,465	59,609		21,327	33,483	
November	33,304	57,794		21,399	32,116	
December	35,633	55,668		21,978	31,012	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
At end of 1938					
March	50,797	48,473	5,490	180	1,212
April	40,614	45,008	4,812	155	1,083
May	40,598	45,426	4,876	169	816
June	44,729	49,290	4,488	190	904*
July	45,529	52,081	5,014	711	944
August	41,002	49,922	4,659	672	1,032
September	35,386	53,815	5,339	662	1,599
October	34,901	54,720	4,916	669	1,796*
November	31,255	54,283	4,409	349	2,267
December	27,084	57,800	6,120	268	1,864
At end of 1939					
January	30,975	59,155	4,827	198	1,557
February	28,559	59,399	4,318		1,826

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
End of: 1938				
February	47,459	44,200	16,341	108,000
March	41,882	44,700	22,418	109,000
April	39,071	42,960	31,969	114,000
May	32,859	40,600	20,541	94,000
June	32,079	42,580	17,341	92,000
July	40,400	39,150	25,450	105,000
August	47,772	34,500	18,728	101,000
September	48,927	29,200	17,873	96,000
October	51,062	26,100	21,838	99,000
November	51,114	26,700	14,186	92,000
December	45,105	26,800	18,095	80,000
End of: 1939				
January	48,210	30,000	26,790	105,000
February	55,814	30,000	20,186	106,000
March	55,981	30,000	15,019	101,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At End of:	1934	1935	1936	1937*	1938*	1939
January	661,948	698,153	600,479	454,249	549,762	497,665
February	663,308	686,195	599,355	445,265	565,833	479,578
March	666,382	678,809	583,318	447,856	586,666	459,723
April	658,796	677,006	567,172	428,249	586,291	.....
May	689,239	677,569	541,871	413,134	568,158	.....
June	672,804	671,525	520,255	434,250	573,136	.....
July	676,200	679,061	519,074	445,782	580,654	.....
August	674,702	680,644	500,520	457,462	565,394	.....
September	694,361	661,509	493,585	470,768	551,447	.....
October	680,616	655,000	486,159	479,398	540,976	.....
November	684,408	617,300	466,491	493,266	512,196	.....
December	705,975	613,987	466,576	545,533	482,852	.....
Monthly Avge.	677,395	666,397	528,738	460,022	555,280	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis								
Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	11,004	6,635	13,437	13,355	11,376	15,565	7,532	14,062
Apr.-June	12,980	14,412	13,565	12,597	14,892	15,834	8,358	
July-Sept.	9,245	14,707	9,822	11,312	14,914	12,207	11,240	
Oct.-Dec.	6,856	9,550	10,406	12,099	14,858	9,704	13,052	
Total	40,085	45,304	47,230	49,363	56,040	53,310	40,182	

Shipment Figures on Quarterly Basis								
Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,760	6,981	10,730	11,154	10,554	14,143	7,534	12,484
Apr.-June	18,021	15,139	14,998	13,473	15,940	15,741	10,363	
July-Sept.	8,141	13,707	11,648	13,489	14,037	13,106	11,748	
Oct.-Dec.	5,329	8,265	9,310	12,066	12,855	10,495	12,685	
Total	40,251	44,092	46,686	50,182	53,386	53,485	42,330	

Inventory Figures [2]								
Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,878	7,290	11,651	11,675	8,762	12,004	10,521	10,109
Apr.-June	4,999	6,615	10,219	10,755	7,556	12,081	8,470	
July-Sept.	6,096	7,595	8,419	8,288	8,690	11,200	8,022	
Oct.-Dec.	7,644	8,888	9,455	8,196	10,717	10,383	8,451	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
Jan.	4,802	2,697	4,581	4,348	2,448	4,163	10,971	10,801	8,932
Feb.	5,059	2,156	4,344	4,215	2,291	3,739	11,868	10,559	9,573
Mar.	5,704	2,680	5,137	5,580	2,795	4,583	12,004	10,521	10,109

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis								
Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	10,721	6,230	12,823	12,553	11,891	15,831	7,314	12,248
Apr.-June	11,913	13,001	13,191	11,631	14,624	15,413	7,380	
July-Sept.	8,286	14,356	10,321	11,270	15,320	12,038	10,794	
Oct.-Dec.	5,970	9,000	9,891	12,425	15,201	9,092	12,360	
Total	36,890	42,587	46,226	47,879	57,036	52,374	37,848	

Shipment Figures on Quarterly Basis								
Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,918	6,539	10,640	11,252	11,367	14,606	7,387	11,286
Apr.-June	16,271	13,292	14,553	11,928	15,113	15,495	9,564	
July-Sept.	7,761	13,370	11,545	13,251	15,069	12,901	11,243	
Oct.-Dec.	4,961	8,189	8,306	11,636	12,874	9,765	12,099	
Total	37,911	41,390	45,044	48,067	54,423	52,767	40,239	

Inventory Figures [2]								
Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,448	6,369	10,244	10,406	8,660	11,993	10,547	8,901
Apr.-June	5,174	6,097	8,795	10,050	8,075	11,833	8,337	
July-Sept.	5,753	7,008	7,639	7,565	8,595	11,326	7,859	
Oct.-Dec.	6,749	7,815	9,180	8,231	10,945	10,312	8,166	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
Jan.	4,837	2,516	4,098	4,424	2,527	3,936	11,183	10,582	8,069
Feb.	5,128	2,216	3,681	4,570	2,216	3,335	11,821	10,579	8,415
Mar.	5,866	2,582	4,470	5,612	2,645	4,015	11,993	10,546	8,901

[1] Based on reports received from the Rubber Manufacturers Association.
[2] Held by manufacturers at end of period indicated.
* Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937*	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,635	2,000,985	488,650	166,142	125,081	41,061	2,655,777
1938*							
July	141,443	106,841	34,602	9,007	5,273	3,734	150,450
Aug.	90,494	58,624	31,870	6,452	3,063	3,389	96,946
Sept.	83,534	65,159	18,375	6,089	4,290	1,799	89,623
Oct.	209,512	187,494	22,018	5,774	5,412	362	215,286
Nov.	372,413	320,344	52,069	17,992	15,423	2,569	390,405
Dec.	388,346	326,006	62,340	18,670	15,518	3,152	407,016
1939							
Jan.	339,152	280,033*	59,119*	14,794	11,404	3,390	353,946
Feb.	297,841	239,980*	57,861*	14,300	10,914	3,386	312,141
Mar.	371,940	299,703	72,237	17,549	12,689	4,860	389,489

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							NETHERLAND INDIES [4]						
	Gross Exports	Imports	Net Exports	Ceylon [2]	India & Burma [3]	Sarawak [3]	British North Borneo [3]	Siam [3]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [5]	World Total [6]
1923	252,016	70,432	181,584	39,971	6,416	3,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,562	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,296	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,528	15,178	17,792	9,512	41,080	57,526	94,501	145,909	58,518	14,618	12,920	887,892
1937:															
Dec.	56,791	13,949	42,842	9,529	2,708	3,009	1,172	2,957	9,108	12,272	11,731	5,384	2,011	1,032	103,755
1938:															
Jan.	47,986	17,078	30,908	5,222	1,379	3,485	1,307	2,897	4,476	9,283	12,708	6,088	878	1,538	80,169
Feb.	48,899	11,874	37,025	5,216	1,409	8	918	3,266	6,391	8,777	12,154	3,070	1,542	1,032	80,808
Mar.	49,197	15,813	33,384	3,834	1,235	1,564	853	2,837	5,673	10,156	15,447	3,213	1,831	1,322	81,349
Apr.	53,864	9,158	44,706	1,951	1,327	1,728	1,158	1,583	5,967	10,081	12,434	3,647	1,004	774	86,360
May	38,245	10,325	27,920	2,833	1,470	1,648	815	2,507	4,575	7,515	9,944	3,118	1,053	904	64,302
June	42,258	14,394	27,864	3,693	1,318	2,441	643	3,904	4,519	7,788	12,120	4,776	718	818	70,602
July	43,689	18,713	24,976	3,861	1,083	2,057	937	4,710	6,808	8,271	19,955	5,139	625	1,063	79,485
Aug.	47,246	13,735	33,511	4,401	953	965	728	4,793	4,757	7,339	11,006	3,840	1,050	1,074	74,417
Sept.	40,992	10,586	30,406	3,990	1,036	756	284	3,893	4,026	7,052	9,092	8,139	758	1,292	70,724
Oct.	42,294	16,599	25,695	4,893	1,111	1,612	1,075	4,438	4,486	8,229	17,166	3,638	1,796	1,092	75,231
Nov.	39,340	10,219	29,121	6,422	1,271	929	567	3,223	3,975	5,678	9,568	4,035	1,159	990	66,938
Dec.	32,901	7,607	25,294	3,212	1,586	599	227	3,029	1,873	4,332	4,315	9,815	2,205	1,021	57,508
1939:															
Jan.	43,332	19,049	24,283	7,237	1,887	2,342	1,604	2,918	6,787	11,261	20,497	4,739	1,812	1,200*	86,567
Feb.	43,084	13,889	29,195	5,575	1,572	1,484	664	5,599	4,833	8,410	11,658	5,657	1,112	1,200*	76,959
Mar.	43,259	14,035	29,224	3,642	1,417	1,177	344	4,916	.....	.....	.....	3,994	.....	1,200*	.....

All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. [1] Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. [2] Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. [3] Official statistics. [4] Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. [5] Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. [6] This total includes the third column for British Malaya and all other figures shown for other territories. * Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	3,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,063	1,055,356
1938	406,343	133,079	59,660	90,200	25,696	45,836	28,170	25,650	11,944	11,309	5,092	16,034	2,400	9,936	871,349
1937:															
Dec.	69,660	10,655	5,736	9,580	2,619	1,995	1,976	1,607	767	1,286	318	1,008	200*	1,890	109,297
1938:															
Jan.	45,596	15,458	4,769	6,314	1,789	4,933	1,809	693	574	1,257	300	1,239	200*	1,102	86,033
Feb.	40,977	16,505	5,456	6,959	615	3,172	2,000	2,341	578	974	534	1,114	200*	1,771	83,196
Mar.	42,075	15,911	4,845	10,768	2,123	6,220	1,365	2,162	1,043	961	342	1,088	200*	1,324	90,427
Apr.	31,870	14,653	5,757	6,497	999	5,454	2,397	4,281	640	904	449	971	200*	920	75,992
May	27,809	14,675	5,169	9,595	2,545	3,327	2,422	4,163	1,041	1,137	419	1,283	200*	957	74,742
June	26,429	14,053	4,542	7,478	3,243	2,145	2,399	505	805	853	663	1,149	200*	988	65,452
July	22,209	12,678	5,433	6,927	2,685	3,099	3,641	541	1,215	1,106	528	1,151	200*	635	62,048
Aug.	31,494	12,891	3,662	7,190	1,832	2,033	2,078	739	1,182	1,238	259	965	200*	595	66,358
Sept.	34,436	8,100	5,094	7,390	1,405	3,584	1,799	1,725	1,779	519	385	1,830	200*	608	68,854
Oct.	33,830	3,085	3,791	6,326	3,139	3,204	3,921	2,000*	1,780	848	420	3,022	200*	9	65,575
Nov.	32,567	936	5,322	7,275	3,123	4,665	1,984	4,000*	660	636	530	1,209	200*	379	63,486
Dec.	37,051	4,134	5,820	7,481	2,198	4,000	2,355	2,500*	647	876	263	1,013	200*	648	69,186
1939:															
Jan.	36,614	814	4,684	7,227	2,867	2,553	2,133	4,000*	910	898	454	1,037	200*	1,131	65,522
Feb.	30,578	4,940	5,315	7,569	1,451	3,263	2,025	2,000*	1,741	1,068	184	858	200*	524	61,716
Mar.	45,286	8,144		8,036						1,242	368				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE: THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.